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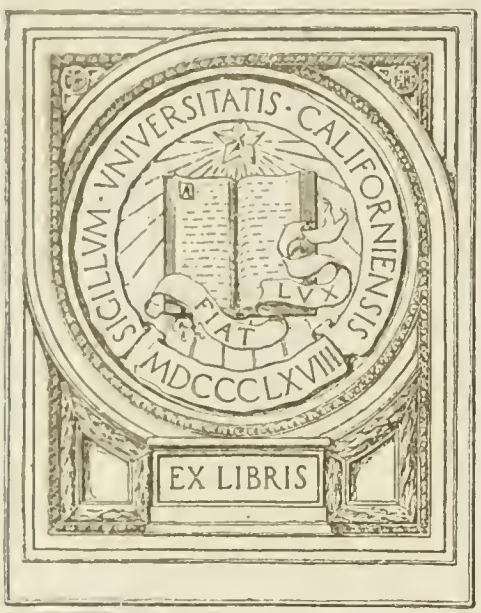

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AND ITS PROVINCES

IN TWENTY-TWO VOLUMES
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VOLUME XXII

THE PACIFIC PROVINCE

PART II

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SIR RICHARD McBRIDE

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CANADA
AND ITS PROVINCES

A HISTORY OF THE CANADIAN
PEOPLE AND THEIR INSTITUTIONS
BY ONE HUNDRED ASSOCIATES

GENERAL EDITORS: ADAM SHORTT
AND ARTHUR G. DOUGHTY

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PUBLIC ADMINISTRATION

PUBLIC ADMINISTRATION

STRICTLY speaking, public administration includes every function of government, but as many of these functions as exercised in British Columbia are dealt with in other articles in this section of this work, for present purposes it is proposed to discuss those which more particularly relate to community regulation, apart from private or special material interests. Included among such features as should have consideration are the constitution of the government, the administration of justice, social economics, taxation, and municipal organization. The laws and regulations thereunder relating to education, forestry, land and agriculture, mining, fishing, and general economic subjects are dealt with elsewhere, and only very incidentally come within the purview of this article.

The Administration of Justice

Historically, the administration of justice in the territory which now includes British Columbia considerably antedates the formal organization of the Vancouver Island and mainland colonies. In a vague way British common law had effect throughout the Oregon territory and New Caledonia from a time which shaded off into the obscurity of native sovereignty. When Great Britain and the United States, so to speak, established a *modus vivendi* in regard to the disputed territory, Canadian laws were extended contemporaneously and made to apply to British subjects. Likewise United States laws extended to United States subjects. Where, however, disputed territory ceased to be disputed territory was wholly uncertain until after the treaty of 1846. The jurisdiction of the provisional government of

Oregon, which was the first attempt at political segregation on the north-west coast, had no exact metes and bounds.

As until the founding in 1849 of the colony of Vancouver Island, which was limited in its area, there were no settlers north of the 49th parallel, the application of Canadian law was supererogatory in the extreme. The only white population were the servants of the Hudson's Bay Company, and the latter was a law unto itself. There were no justices of the peace or officers of the law apart from the officers of the company. Violations of the company's rules were punished by the company, but it is difficult to say what would have happened in the case of the perpetration of serious crime by servants of that corporation. To have brought a criminal within the operation of the Canadian law would have meant his deportation to Eastern Canada, and that was out of the question. In such a case we may assume that the Hudson's Bay Company did deal, or would have dealt, with it in its own way. As between the Indians and the white men, it resolved itself into a matter of summary vengeance. If an Indian killed a Hudson's Bay Company's servant, he was killed in turn. It was an eye for an eye and a tooth for a tooth—the only kind of justice which appealed to the Indian's moral intelligence. Among themselves the natives settled everything according to this primitive code, and it must be remembered that they still possessed sovereign tribal rights. H. H. Bancroft has written a volume on popular tribunals, in which he related a great many instances of the crude methods of administering justice on the Pacific slope in early days, but few of these relate to the country north of the 49th parallel. From the beginning, except in a few instances, law and order were respected under British rule.

The first official act recognizing the local right to administer justice on British soil was in 1849, when at the instance of Sir J. H. Pelly, governor of the Hudson's Bay Company, the colonial secretary of Great Britain, under authority of 1 and 2 Geo. IV, cap. 86, appointed fourteen justices of the peace—all Hudson's Bay Company officials—on Vancouver Island and on the unorganized mainland. When Vancouver Island was formally erected into a colony,

so much of the Georgian legislation in question as related to Vancouver Island was repealed, special provision being made for administration according to British laws and local ordinances. It will be remembered that one of the first official acts of Governor Blanshard was to appoint Dr J. S. Helmcken a magistrate at Fort Rupert for the purpose of keeping the peace among the miners and bringing the Indians to justice.[1] Helmcken's tenure of office was brief, however, and the governor himself complained that his own position was little better than that of an ordinary magistrate. Blanshard's successor, Governor Douglas, recommended his own brother-in-law, David Cameron, for judge of the supreme court of civil justice, and in 1856 Cameron was promoted to the chief justiceship, his position being not unlike the schoolboy who was head of a class of which he was the only member. One cannot but appreciate as almost ironical the 'feeling of dismay' expressed by Douglas when called upon to introduce representative government and convene a legislative assembly. Notwithstanding that he had previously appointed his brother-in-law to the bench, he told Henry Labouchere (afterwards Lord Taunton), secretary of state for the Colonies, that 'possessing a very slender knowledge of legislation himself, he was without legal advice or intelligent assistance of any kind.' In this he was hardly fair to Cameron, who, though not learned in the law, is stated to have made a very 'sound judge,' and apparently satisfied requirements until his retirement in 1865. His duties, it is true, were not arduous and his legal problems not intricate. Governor Douglas, too, without any previous experience of governmental affairs, achieved a success in his gubernatorial capacity that belied his own self-depreciation.

Government on Vancouver Island

Government on Vancouver Island was then of a simple character. It however carried with it very considerable responsibility, particularly so from its one-man character. Blanshard, before his resignation as governor, appointed an

[1] See p. 92.

executive council of three, in accordance with instructions from the home government. In a sense this body might be regarded as a cabinet, although, by virtue of Douglas's dual capacity as chief of the Hudson's Bay Company in the Western Department and governor of Vancouver Island, government was purely autocratic. The council was advisory and to a certain extent an executive, but the influence of the governor was supreme. Even after a legislative assembly had been called into existence, the situation was not greatly altered. The control of parliament over expenditure is its strength, and in reality its *raison d'être*, but in Vancouver Island, until the Hudson's Bay Company's charter was extinguished, the only revenues under the exclusive control of the assembly were those arising out of licence fees, and these were exceedingly limited. Revenues arising out of the sales of lands, timber, etc., were appropriated by the governor as the representative of the company. His only duty to the assembly, in that respect, consisted in submitting a statement of receipts and expenditures. The governor practically made the laws, his ordinances being subject only to imperial veto. The assembly and the council, the members of the latter appointees of the governor, all of them being Hudson's Bay Company's officials, constituted parliament. The situation resembled not a little the old Family Compact days of Upper Canada. In 1859, when Douglas proposed to build parliament buildings on the west side of James Bay and to connect them with the old town by means of a bridge—the most considerable undertaking of the colony up to that time—and the assembly protested against the usurpation of its authority, he calmly told the members, in effect, that as they had not appropriated the funds and were not responsible for the undertakings—the moneys being advanced by the Hudson's Bay Company—they had nothing to say in the matter. The buildings were erected, and, as subsequent events proved, the action of the governor, as well as the selection of the site, was a wise one.

In the article on colonial history,[1] legislation and administration, such as they were, have been outlined, and it will be

[1] See 'Colonial History, 1849-1871,' in this section.

unnecessary here to review them at any length. The first period of colonial history was marked by provisions for regulating the liquor traffic by a system of licensing, for the establishment of a few public schools, for the erection of places of public worship, for means of defence—never called into requisition—for establishing a fiscal system—one of free trade pure and simple—for appropriating the limited revenues at the disposal of the legislature, and for administering justice in a primitive but effectual way. The land laws were practically fixed by the tenure by which Vancouver Island was held by the Hudson's Bay Company.

Government of the Mainland Colony

The government of the mainland colony of British Columbia was for several years a more simplified form of administration than existed even on Vancouver Island. It was wholly a one-man government, and James Douglas was the one man. The situation gave to him, as chief executive, powers only limited by instructions from, or veto by, the secretary of state for the Colonies. There were besides, it is true, such officials as the chief commissioner of Lands and Works, the chief justice and the attorney-general or legal adviser to the crown ; but in all matters of public policy and important affairs of state the governor was supreme. It was not intended, of course, that this autocratic, or bureaucratic, form of administration should continue to exist indefinitely, and provision was made at the outset for some form of representative or executive council as soon as conditions in the colony warranted it. In 1861 protests were made to the imperial authorities against its further continuance. Douglas could justify his course on the grounds that as the great majority of the population was made up of miners, shifting in their abode, and not to be counted upon as permanent residents of the colony, and as the number of farmers and landowners was infinitesimally small, there was really no material out of which to create a representative government responsible for its trusts. He pointed out—and this is important to remember —that New Westminster, the only place of any commercial

importance, had been organized as a municipality, the first in the Pacific colonies, and that his policy as governor was to encourage local self-government at other points in the colony as soon as the number of permanent residents should warrant it. There were several other such places in prospect—Yale and Hope, and in Lillooet and Cariboo—and it was natural that these urban centres would increase as the interior of the colony developed. With this view the colonial secretary concurred for the time being. In 1863, however, Cariboo having secured a considerable population, definite instructions came from Downing Street for the formation of a legislative council, the first session of which was held in 1864. This was only partially representative, being made up of heads of departments, one-third; magistrates from various districts, one-third; and persons elected from various electoral districts, one-third. After the union of the two colonies in 1866 this was the form of government which existed until 1871.

In their general features the administrations of the colonies of Vancouver Island and British Columbia were those of crown colonies, with the preponderance of power and influence vested in the government and executive appointees with direct responsibility to the imperial authorities. The personnel of the legislative assembly of British Columbia changed from session to session, and this is more or less true of the legislative council.

The Development of Municipal Government

Governor Douglas's idea of developing municipal government throughout the province, the various municipal bodies to form a nucleus of a central parliament, giving to the people a popular form of government based on political option, so to speak, was almost ideal in conception; but, as subsequent events proved, it would have been exceedingly slow of realization. Owing to the peculiar physical circumstances of British Columbia, with its widely separated and sparsely settled areas, it took many years for municipal government to develop and extend. Until comparatively recent years there were only three municipalities on Vancouver Island,

one of which was rural; while on the mainland there were only five in 1886 and eight in 1896, three of which were urban. All of these were created by letters patent or by special act of the legislature, among which in order of priority were: New Westminster (1860), Victoria City (1862), Langley township (1873), North Cowichan township (1873), Nanaimo City (1874), Surrey township (1882), Chilliwack township (1883), Vancouver City (1886), Delta township (1888), North Vancouver (1891), Sumas (1892); but these, in so far as their charters are not repugnant to the Municipal Clauses Act, come within the jurisdiction of that act, and all municipalities formed after April 23, 1892, are regulated by the provisions of the Municipal Clauses Act, and this leads up to a brief consideration of the character of the administration which was involved as a consequence.

The same physical conditions which prevented the growth of municipal institutions developed a local form of administration almost unique in the Empire—that of a government agency, one of delegated functions. Mining camps and other settlements, widely segregated over so vast an area, communication between which was difficult and expensive, demanded at central points some individual with administrative authority in order to facilitate business which affected crown interests. Accordingly, government agencies were created for the various districts, which were necessarily wide administrative constituencies. The government agent in the more remote districts such as Kootenay and Cassiar exercised functions of a diversified character. In addition to being government agent, in which capacity he represented the government in a general way, receiving its instructions as well as all local revenues, supervising all public expenditure of whatever nature, etc., he might be, and usually was, stipendiary magistrate, gold commissioner, mining recorder, water commissioner, issuer of marriage licences, assessor and collector, and often acted as policeman. In other less inaccessible districts these duties were more or less divided, and as time went on subdivision of labour became greater. The government agency system is the system still in vogue and, in the circumstances of a province so exceptional in its configuration,

has worked out most successfully. There have been only a few instances in which officials responsible for many delegated duties have abused their authority, and in the great majority of instances they have been men not only of integrity and intelligence, but of unusual resource and courage.

Although municipalities have greatly multiplied during recent years, there is still but a very limited area under municipal control. From the outset, therefore, administration in respect of all matters of governmental authority has been very much concentrated in the central executive, with a corresponding responsibility regarding the collection and expenditure of revenues. All public lands are under the direct control and administration of the government, as are also mines and timber. These three capital assets are of immense importance and extent. Therefore the labour and expense of administering them through the various departments are much greater than in any of the other provinces. The fisheries of the territorial waters in and about the province, through recent arrangements made at Ottawa with the minister of Marine and Fisheries there, are also practically under the control of the local government. Outside of the municipalities, the government through its assessorial branch of the department of Finance, taxes all lands and other taxable assets. The roads of the province, some eighteen thousand miles in extent, are built out of public funds; and as there are no county councils, all trunk roads, whether running through, alongside of or between municipalities, are built and maintained at the expense of the government. All bridges, ferries and wharves, public buildings (including court-houses, lock-ups and gaols), reformatories and asylums, and, in a large part, hospitals, are provided for in the estimates of public works. Even in educational matters, the sole control of schools was in the hands of the minister of Education. Until quite recently, schoolhouses were built and maintained, and the salaries of teachers paid, out of provincial funds. This state of affairs existed until 1888, when the city councils of Victoria, Vancouver, New Westminster and Nanaimo were required to contribute one-third of the salaries of the teachers. In 1891 all city schools were classi-

fied in three grades, and a *per capita* allowance made for school purposes according to grade. The principle of local control was extended from time to time, until in 1906 it was recognized in its entirety. Except in certain localities, too sparsely settled or too remote, all expenditure is met and controlled by the local school boards, the province contributing upon a *per capita* basis. It will be seen that throughout all branches of administration special conditions have differentiated British Columbia from all other provinces of the Dominion. The municipal system will gradually extend, but from the very nature of things by far the greater part of the area of the province must for all time remain under the direct control of the central executive.

The municipal system was introduced in 1860, when New Westminster was given local self-government. Victoria, though much older, was not incorporated until 1862. These cities were organized under letters patent or special charter, and it was not until 1892 that legislation governing municipalities was definitely codified. Development followed pretty much on the lines of municipal administration in the other provinces, but more especially those of the Province of Ontario, that is, so far as the legislation of Ontario could be made applicable to the special conditions of British Columbia.

The Political Constitution of British Columbia

The political constitution of the province is derived from the British North America Act, and is identical with those of the other provinces in all respects as to general powers and limitations of authority. The Terms of Union only are different, and are, as described by Lord Monck, governor-general of Canada at the time of Confederation, 'in the nature of a treaty.' It is not necessary to detail these terms, which had respect to the building of an inter-oceanic railway, the construction of a dry-dock, the number of representatives in the Dominion parliament, the pensioning of certain officials, the trusteeship of the Indians, a mail service to San Francisco, etc. They were peculiar in several respects, inasmuch as while they did not give responsible government to the pro-

vince, they authorized it 'when desired by the inhabitants of British Columbia,' and in the meantime provided that a majority of the members of the legislature should be elective; also that the existing customs tariff and excise duties of the old colony should continue in force until the completion of the Canadian Pacific Railway, unless otherwise decided by the legislature; and also that the Dominion government should use its influence to secure the continued maintenance of the naval station at Esquimalt. However, responsible government came into being coincidentally with the union, and the legislature at its first session adopted the customs tariff and excise duties of Canada, thus definitely and satisfactorily disposing of these two matters.

For Dominion electoral purposes the province was divided into five electoral districts, with six representatives in the House of Commons and three in the Senate—New Westminster, Cariboo (including Lillooet), Yale (including Kootenay), Victoria (including the immediate surroundings), and Vancouver Island (including the remainder of the island and the adjacent islands).

Finances of the Province

The financial relations, upon which so much stress has been laid of recent years, were based upon the following allowances: $31,000 per annum, on account of the difference between the actual amount of indebtedness at the date of the union and the indebtedness per head of the provinces of Nova Scotia and New Brunswick, the population of British Columbia being taken at 60,000; $35,000, annual allowance for purposes of government; $48,000, annual *per capita* grant at eighty cents per head of population; and $100,000, annual allowance in lieu of lands in railway belt—$214,000 in all. There were some readjustments in the meantime, but, with the exception of the statutory increases of the *per capita* grant, these amounts were received annually until the general readjustment of 1907. In 1901 the total subsidy was $305,969. In 1908, as the result of the general readjustment of subsidies in 1907, and an additional allowance of $100,000, the province

received $522,077. The amount of subsidy in 1912-13 was $723,135. It is claimed by the provincial government that the allowance of the Dominion government for local administration was wholly inadequate in the first instance, and that even now, with the additional allowances made in 1907, amounting to $245,000 per annum, it is still quite insufficient to meet the requirements of a province so physically handicapped as is British Columbia.

In colonial days the cry of Sir James Douglas and subsequent governors was for money to open and administer the country, and when fervent appeals were made to the imperial authorities for aid in the way of subsidies or loans, they were told that a country reputedly so rich as British Columbia should be self-supporting ; but Downing Street did not understand the situation—with such physical obstacles to be overcome, financing the province was a difficult problem. After Confederation it still remained a problem. Until the end of 1903-4, the total deficits for thirty-one years amounted to nearly $10,500,000, while the surpluses for three years amounted to only $138,728. The bonded debt at that period, accumulated during thirty-four years, amounted to $12,500,000, while there was a floating liability of another $1,000,000. The credit of the province was very much strained, and, owing to a long period of political turmoil and astonishingly frequent changes of administration, public confidence was badly shaken. This was the darkest hour just before the dawn of revival. Undoubtedly political conditions had had much to do with the slowness with which business in British Columbia responded to the active movement in other parts of Canada.

The return of good times was coincident with the incoming of the McBride administration in 1903. The low state of finances necessitated a temporary loan of $1,000,000 and demanded that the utmost economy should be observed to restore confidence. Taxation was increased and new sources of revenue were created. Almost immediately deficits were changed into surpluses, and until the end of 1910-11 approximately $11,000,000 of surpluses had been accumulated, practically offsetting the deficits of the previous thirty-

five years. The public debt at the end of 1911-12 was $9,239,425, and could have been wiped off, if desired, with the cash that had been in the banks to the credit of the province.[1]

This, however, must not be regarded as a normal condition of affairs. Just at the time when the McBride government came into power attention began to be concentrated upon British Columbia. Arrangements had been made to build the Grand Trunk Pacific, and land and timber in the northern interior and on the coast were much sought after. The Canadian Pacific Railway acquired the Esquimalt and Nanaimo Railway and began an active programme of improvement on Vancouver Island. The success of commercial fruit-growing in several districts, notably the Okanagan valley, gave a fillip to the industry and created a boom in agricultural lands. By 1907 there was such a furore of speculation in respect of timber special licences that the government reserved all timber from further alienation. Real estate speculation and the purchase of government lands also became active all over the province. The depression of the latter part of 1907 and a portion of 1908 created a temporary lull, but by 1909 activity was strongly renewed. Then came the government announcement of a vigorous railway policy of guaranteeing the Canadian Northern Railway Company bonds for the construction of six hundred miles of railway in British Columbia and of liberal aid to the Kettle Valley Railway. This, with the construction of the Grand

[1] On March 31, 1912, the bonded debt of the province stood as follows:

4½ per cent Debenture stock, Loan Act, 1887	$381,210.00
3 per cent Inscribed stock, Loan Acts, 1891, 1893, 1895, 1899 and 1902	9,921,936.00
3½ per cent Diking debentures, Loan Acts 1897, 1898 and 1899	475,000.00
5 per cent Treasury debentures, Loan Act, 1903	8,000.00
	$10,786,146.00
Deduct accumulated sinking fund	2,193,793.00
	$8,592,353.00
Railway guarantee bonds (Nakusp and Slocan Railway Aid Act, 1894)	647,072.00
	$9,239,425.00

SQUATTER HOMES AT PRINCE RUPERT, 1909

Trunk Pacific through the Rockies to Prince Rupert, stimulated activities of all kinds to an unusual degree. Then followed the railway policy of 1911, providing for a further extension of the systems referred to, for a line of railway from Vancouver to Fort George having the Peace River ultimately in view, and for various extensions of the Canadian Pacific Railway system. The prospective early opening of the Panama Canal led the Dominion government to adopt a policy of extensive improvements of harbours and the building of a dry-dock, requiring many millions of dollars to complete. These big undertakings, together with the extensive, almost gigantic programme of road-building and public works on the part of the local government, had an unwonted effect on business of all kinds, much of it unduly speculative. The consequent revenue arising out of timber licences, land sales, sales of government lots in town-sites, land registry fees, the formation of companies, the Chinese *per capita* tax, and from many other sources, was enormous, increasing several millions each year. This state of affairs, as already observed, was abnormal and does not by any means represent stable conditions, when the speculative element shall have been eliminated from business and land and real estate transactions. The local government, to provide for pressing needs and prospective development, engaged, as already stated, in many large and expensive undertakings, with the result that in December 1913 it had almost completely exhausted its bank deposits, which had been as much as $9,000,000. The problem, therefore, of administering a province of such extent and rugged exterior is a serious one from the financial point of view, and must be such for all time to come. For instance, there are now 18,000 miles of roads built, and it is estimated that to completely connect up the various settlements by trunk roads alone will take 18,000 miles more, at a cost of $50,000,000. As population and revenue increase, the expenditure required to meet the wants of a population in a province so extensive and mountainous increases in a still greater proportion. That has been the experience since Confederation under all administrations. As an illustration of this as well as of the expansion of revenue

and expenditure, we find, by taking every tenth year from the outset, the following :

Year	Net Revenue	Net Expenditure
	$	$
1872 . .	327,215	432,082
1882 . .	455,083	474,428
1892 . .	1,038,237	1,370,431
1902 . .	1,807,925	2,537,373
1912 . .	10,745,709	11,189,024

During the first session of the provincial legislature authority was taken to float a loan of $300,000, under which apparently no action was taken, as the McCreight ministry only lasted one year, but in 1875, under the British Columbia Loan Act of the previous year authorizing a loan of $300,000 at seven and one-half per cent, $82,850 was added to the revenue. In that year the government was in very hard straits for money, and got advances from the Dominion against the subsidy account for $339,150 for public works and for the construction of the dry-dock, which the province was unable to finance even on a guarantee of five per cent on £100,000 by the Dominion and a bonus of £30,000 from the imperial government. Of this amount $150,000 was pledged to the Dominion against the annual allowance under the Terms of Union. It was what is known in local history as ' pawning the subsidy.' The government also borrowed over $30,000 from the Bank of British Columbia and $30,000 from Sir James Douglas, for which interest at the rate of eight per cent was paid. These financial improvidences, as they seemed to be at the time, brought about the defeat of the government; and as the finances were in a parlous condition and creditors were clamouring, the Elliott government, which came into power in 1876, passed an act to borrow $350,000 at seven per cent, which it proceeded to do. In this year also, to provide further for revenue, the government made a departure new in Canada—the imposition of direct taxation.

The rates under this first general assessment act, the foundation of the present system, were: one-third of one per cent on the assessed value of real estate; one-fifth of one per cent on personal estate; and one-half of one per cent on incomes of $1500 and over. What was called a school tax of three dollars per head was imposed on each male person of age. This afterwards was officially changed in name to 'revenue tax' and was more familiarly known as the 'poll tax.' It was abolished during the legislative session of 1913. Tolls on the Cariboo Road, which had been abolished in 1871, were reimposed, though eventually they were taken off. A wild-land tax of one per cent on the assessed value of the land was imposed in 1873. In 1876 this was changed to an annual tax of five cents per acre on all unoccupied land, which by an amendment of the following year was declared to mean land on which there were not existing improvements equal to the value of $2.50 per acre. All this legislation was unpopular and led to the defeat of the government, but has remained in various modified forms on the statute-book ever since.

To revert to the subject of loans, in 1877 another was authorized to the extent of $750,000 at six per cent, which was supplemented by private loans to the amount of $45,500. In 1887 a million dollar loan at four and one-half per cent was issued. In 1891 legislation was passed making provision for consolidating the public debt and issuing stock bearing interest at three per cent. Subsequent to that all ordinary loans were issued in accordance with the Inscribed Stock Act, 1891. In 1891 the province went to the London money market for $700,000; in 1893, for $600,000 for parliament buildings; in 1895, for £420,000; in 1899, for £340,000; and in 1902, for £721,000. In addition to these there were floated locally $100,000 at three and one-half per cent in 1897 to complete the parliament buildings, and $1,000,000 in 1904 bearing interest at five per cent and payable in ten equal instalments.

Further obligations were assumed in 1897, 1898 and 1899 in the guarantee of bonds, amounting to $744,000, for the diking and reclamation of certain flooded areas in the lower Fraser valley. This was a charge against the land, but a few

years later a considerable portion of the arrears was wiped off. The province, in 1890, also guaranteed the interest on bonds of the Shuswap and Okanagan Railway at four per cent for twenty-five years ; on the Victoria and Sidney Railway bonds at two per cent for twenty-five years to the amount of $300,000 ; and in 1894 the interest and principal on the Nakusp and Slocan Railway bonds to the amount of $647,072 for twenty-five years at four per cent. The Shuswap and Okanagan and the Nakusp and Slocan Railways were leased by the Canadian Pacific Railway, and a working arrangement made with the British Columbia government by which forty per cent of the gross proceeds of traffic should go to the province, but as the arrangement was afterwards construed to be on the basis of the 'long haul,' the province got the worst of the bargain, and was considerably the loser. However, in 1912, by an arrangement with the Canadian Pacific Railway by which there was a general readjustment of outstanding differences, the railway company relieved the government of all further liability *re* the Shuswap and Okanagan Railway and refunded the government its outlay in connection therewith. The guarantee on the Victoria and Sidney Railway bonds proved to be a total loss.

Such is the history of borrowing and guaranteeing of bonds up to 1905, since which time the province has not been under the necessity of borrowing, but, on the other hand, has had large surpluses in the bank drawing interest.

In the meantime, however, British Columbia has assumed liabilities in connection with the Canadian Northern and Pacific Great Eastern Railways that ten years previous would have been startling to propose. In respect of these lines the province followed the example of Manitoba as well as of other provinces and the Dominion of guaranteeing bonds at four per cent, taking a first mortgage on the lines assisted as security. By virtue of legislation of the years 1910, 1912 and 1913 bonds to the extent of $56,900,000 were guaranteed upon 1385 miles of railway and terminals. Cash subventions were given to the Kettle Valley Railway (otherwise the Canadian Pacific Railway) amounting to $1,450,000 for 300 miles of railway, extending from Midway on the Kettle

River to the Canadian Pacific Railway main line at Hope, via Hope Mountain, over the last section of which line the Great Northern Railway will have running rights, giving the latter line entrance to Vancouver entirely through Canadian territory. Incidentally, as part of the railway policy of 1912, the government bought back from the Canadian Pacific Railway 4,000,000 acres of land, included in the subsidies to the Columbia and Western and the British Columbia Southern Railways, at forty cents an acre. The Canadian Pacific Railway agreed to be taxed on the Esquimalt and Nanaimo Railway land grant on Vancouver Island, which under the Settlement Act of 1884 was to be free for ever so long as unalienated. The Canadian Pacific Railway Company also agreed to extend its line northward from Nanaimo seventy-five miles without further consideration, and, as already stated, to relieve the province from further liability in connection with the Shuswap and Okanagan Railway, refunding the outlay of the government in respect of it. It also agreed to restore the Kaslo and Slocan Railway, which had been abandoned by the Great Northern Railway Company and the road-bed practically destroyed, and to run it continuously for a cash bonus of $100,000.

It may be explained that the Kaslo and Slocan, from Kaslo on Kootenay Lake, taps the rich silver-lead district of Slocan. It had been operated by the Great Northern Railway Company, which purchased it from the original owners. The railway carried a land grant rich in timber. This was disposed of, and after the fires of 1911 had swept the district the company tore up the rails and abandoned the line, leaving a number of the mines without transportation facilities. It may also be explained that former governments had given large land grants to the Columbia and Western Railway line (from the Columbia River through the Boundary country to Midway) and to the British Columbia Southern (Crowsnest Pass Railway from Nelson, on Kootenay Lake, to Lethbridge), and the repurchase of these grants eliminated many complications which had arisen in respect to administration and brought the lands back into the ownership of the province.

At one time it was considered good policy to get railways at any price, and land grants were largely the price. Grants were made to the Esquimalt and Nanaimo Railway, the Columbia and Kootenay, the Kaslo and Slocan, the Columbia and Western, the British Columbia Southern, and the Nelson and Fort Sheppard Railways, and in each instance it was a bargain to be repented of, although indirectly it hastened railway construction and was productive of considerable development.

Government under the Act of Constitution, 1871

Returning now to the formation of government in 1871, the legislative body which confirmed the Terms of Union also framed and passed an act of constitution which has been amended several times since, but without material alteration, except as to the number of the members of the executive and the indemnity of members of the legislature. By the Act of Constitution, 1871, the members of the executive were fixed at five, but in the first instance three ministers were appointed—colonial secretary, afterwards changed to provincial secretary, attorney-general and chief commissioner of Lands and Works. In course of time a department of Agriculture, associated with the department of Finance, a department of Education, in conjunction with the office of the provincial secretary, and a department of Mines were created. In 1909 the Lands and Works, so long associated, were separated, each being given a separate minister. The extent of the duties of a department which included the administration of lands, timber and forestry, water rights, public works and the survey of crown lands was too great for one minister to encompass, and a separate minister of Lands was given charge of the lands, forestry, water and surveying branches. Owing to the railway mileage under the exclusive control of the province—that of the Canadian Northern Pacific and the Pacific Great Eastern, and the British Columbia Electric—still more recently a portfolio of Railways was created, which *pro tem.* is being filled by the minister of Public Works. The department of provincial secretary, to

which is attached the department of Education, includes many branches of administration—the civil service, health and vital statistics, the mental hospital (insane), all education offices, the provincial museum, hospitals and the Old Man's Home. An office still more prolific of duties is that of the attorney-general, who, in addition to his multifarious duties as chief law-officer of the crown, is fishery commissioner for the province, is in control of the regulation of the liquor traffic, is head of the land, court and joint stock company registries, and has under his supervision the inspection of factories, electrical energy, tramways, clubs and insurance. The inspection of trust companies, assessment and taxation and the adjustment of succession duties belong to the minister of Finance The portfolio of Mines, over which the prime minister presides, stands by itself.

At the outset the legislature had a single chamber and there were twenty-five members, representing more or less cumulatively the following districts—Cariboo, Lillooet, Yale, Kootenay, New Westminster and Coast Districts, New Westminster City, Victoria City, Victoria District, Esquimalt, Comox, Cowichan and Nanaimo. This number has increased from twenty-five, through various redistribution bills, to forty-two. At first the Island of Vancouver dominated in number of members and influence, but gradually the mainland, with its greater area, possibilities, and population, gained the ascendancy ; and now that the old sectional feeling of Island and Mainland has been eliminated entirely, representation bears a fair relationship numerically as between the two sections of the province. At first the sessional indemnity was $250 per member, with fifteen cents mileage both ways. The indemnity has since been gradually increased until it is now $1500 per member and mileage.

In many respects British Columbia has been the most progressive of the provinces of the Dominion. Though the most westerly province, for so many years practically isolated from the rest of Canada and slow and difficult to develop physically, the various administrations have kept well abreast of the times. In legislation pertaining to municipal affairs, to agricultural development—particularly in respect of methods

in the fruit-growing industry—to mining, to forestry, to educational institutions, to the fisheries, to water conservation, to the regulation of the liquor traffic, to the care of the sick, aged, and indigent, to the inspection of public utilities, to the system of penology, and to the treatment of the mentally weak, it is doubtful if any other part of the Empire has, taking all things together, made equal advancement. Without too many traditions to hamper them, later administrations at least have been peculiarly receptive to sound, well-tried methods. If governments have not been strong in any one particular, it has been regarding land policy; but even here the peculiar physical conditions of the province have made it difficult to apply principles of settlement and development applicable to the new provinces in the Middle West.

Among the most conspicuous of the public functions in respect of social economics is that of the provincial board of health. Some years ago, during a smallpox epidemic in Victoria, the public authorities found it difficult to deal with it effectively on account of imperfect legislative sanction, and the government had to resort to what was perhaps an extraordinary exercise of executive authority to cope with the situation. As a consequence, an act was passed in 1896 of a very sweeping nature constituting a provincial board of health with almost unlimited powers. The provisions are very elaborate and so framed as to meet any possible emergency. The board consists of the lieutenant-governor in council and a secretary, who must be a member of the medical profession. It has been very active at all times of threatened epidemic and has carried on a strong campaign against the spread, and for the prevention, of tuberculosis. Provisions for general sanitation are wide and very comprehensive. A notable feature of the work, added to the agenda of usefulness by the Schools Health Inspection Act of 1910, is the medical inspection of public schools. This is now being thoroughly done under a well-organized system, and most satisfactory results are reported. At a meeting of the Canadian Medical Association held in London, Ontario, in June 1913, in the public health section the committee on

medical inspection of schools reported that the work along these lines was further advanced in British Columbia than in any other part of the Dominion.

On similar lines, and at about the same time, provision was made for the inspection of mining, logging and railway camps throughout the province. Exceptional conditions exist in British Columbia, and especially during the past few years there has been an unusual amount of railway construction work. During the summer months, too, lumbering is always active, and many men are brought together. Such camps are the most frequent source of typhoid fever, and there are also the important considerations of food and general comfort of the men ; also medical and first aid in case of sickness or accident. It is the duty of the medical inspector, appointed by the government for the purpose, as far as possible to inspect all these camps and especially to investigate promptly all complaints. His authority extends to remedying grievances and to demanding well-cooked food, cleanliness and all reasonable creature comforts. In such a wide and broken country it is not easy always to provide hospital facilities, and men injured by accident or ill with disease have often to be conveyed many miles ; but at all convenient points hospitals, with the usual appliances, have been located, and in the more sparsely settled and remote districts bonuses are granted to resident physicians in order that medical assistance may be available.

The indigent are always cared for—if in a municipality, by the municipality, and if outside, by the province—but the number of destitute in British Columbia is so small that the caring for the poor cannot be regarded as a problem. The province, however, has made special provision for its aged. About 1893 an old man's home was established at Kamloops. A residence of fifteen years in the province is required to qualify for admission. The latest report shows ninety-four inmates, and it is a point of honour with the government that these men, many of whom were active factors in the development of the province in the early days, shall have every comfort and solace that old age demands. The city municipalities also maintain old men's and old women's homes.

The most modern attitude has been assumed towards the insane. A provincial asylum in British Columbia was established over forty years ago, and for over thirty years, before traditions were upset by science, followed in the groove of all such institutions. It was decided several years ago to establish in connection with the asylum an agricultural colony. One thousand acres of rich bottom land in Coquitlam, a few miles from New Westminster City, were secured, and the patients, under skilled direction, have cleared, drained and cultivated about six hundred acres of this area. Farm buildings of the most modern type were erected, and the farm was equipped with the latest and best types of machinery and appliances. The farm was stocked with thorough-bred horses and cattle. The *Farmer's Advocate*, a standard agricultural journal, has described it as one of the most complete and perfect establishments of its kind in existence. New asylum buildings have been erected on an eminence overlooking the cultivated area. In the short time the new order of things has existed wonderful results have followed in the health of the patients and in economic advantages. In 1912 the profits of the farm were $40,258, 'a splendid interest on the investment,' says the report, and the *per capita* cost per annum has been reduced to $177.71 or 48 cents per head per diem, the lowest on record in British Columbia.

Hospitals for the sick receive special attention, and no other part of the continent is better supplied. The erection and maintenance of hospitals have been reduced to a system and nothing is left to haphazard or voluntary contribution on the part of the public, though that is not wanting when occasion justifies. Prior to 1902 there was no method of assisting hospitals apart from the sometimes whimsical will of the legislature. In that year a measure was introduced placing all public hospitals on a uniform footing. These institutions were aided on a *per capita* basis, that is, according to the number of patients. Special cases have special consideration, for which provision is made. In towns where there is no hospital building the government usually contributes a share of the expense. Thus there is co-operation between the people and the government on a definite equit-

able basis, and while the hospitals are under local control they are not subject to government inspection. Where circumstances justify it, denominational and private hospitals are sometimes assisted.

Reforms are being worked out in respect of prisons, reformatories, juvenile courts and the like, much on the lines of the most recent methods of dealing with the erring classes. Prison farms are being established. The reformatories, in which criminals in the making were housed in batches behind walls and iron gratings, to become still more incorrigible, have been changed into industrial schools with fields and workshops. Girls' industrial schools, on a similar foundation, are also being inaugurated. One city at least has a juvenile court.

The control of the sale of liquor in municipalities, that is to say, the licensing power, is in the hands of police commissioners ; but outside of municipalities control is virtually in the hands of the provincial police. All licences are issued by the superintendent of police upon the reports of local subordinates. Very strict regulations are in force regarding the accommodation provided by each hotel, and as to the sale of liquor to minors or persons visibly under the influence of liquor, to interdicted persons, or after prohibited hours. Under the act each locality in rural districts has virtually local option, inasmuch as a licence can only be obtained through a petition signed by a majority of the adult residents (including women) within a certain radius. The old-fashioned method of interdicting habitual drunkards, or dipsomaniacs, by formal appeal to a magistrate has been abolished, and a very simple method adopted in its stead, whereby any person may interdict, or 'Siwash,' as the process is locally known, by having the police give notice. All saloons have been abolished, and hours of opening and closing fixed at 7 A.M. and 11 P.M., except Saturdays, when the hour for closing is 10 P.M. No adulteration of liquors is permitted. The penalties for violation are very severe. All social clubs are licensed and subject to inspection. The strict regulation of the liquor traffic is of comparatively recent date. Up to almost the close of the last century saloon and

hotel bars were open night and day and gambling was permitted. In the city municipalities since that time there has been a gradual approach to a new order of things. Outside the municipal limits very few restrictions, indeed, were placed on the sale of liquor, and it was this fact that induced the attorney-general to take the licensing power out of the hands of local boards and place it in the hands of the police independent of local influence.

Various acts have been passed for the safety and protection of the public and of employees. Adequate provision has been made for the inspection of factories and of boilers throughout the province; for the inspection of electrical energy in its various applied forms; for the inspection of tramways and the regulation of tramway traffic; for the periodical inspection of trust companies, of which there are a great number in the province; and for the inspection of insurance companies. Among acts of this character is the Coal Mines Regulation Act, providing for the safety of miners working underground, declared by *Mines and Minerals*, of Philadelphia, to be a model for all coal-mining regulations. There are, of course, workmen's compensation and liability acts. All contracts with the government or municipalities contain a clause prohibiting the employment of Chinese or Japanese, and another stipulating that the wages paid shall be the wages current in that district. Just recently it has been decided that the issuance of special licences to holders of timber lands should contain a clause prohibiting the employment of orientals, and the prohibition is now (1913) in effect. Similarly, in No. 2 district—the mainland coast of British Columbia—fishing licences are not issued to Japanese or Chinese. Against both of these regulations the Japanese government has entered protest, and it is possible a phase of the Californian question may arise as a consequence. Automobile traffic is also subject to very strict regulations. The speed limit within city municipalities is ten miles an hour and twenty in the country. Chauffeurs must be licensed and are not permitted the use of intoxicants. The owner of the car is responsible for his chauffeur, whether with him in person or not. Any one in charge of an automobile occasion-

ing an accident must report without delay to the nearest constable or police headquarters.

Provincial and Municipal Taxation

It will now be in order to consider provincial and municipal taxation. As was previously intimated, finances always being a serious problem in British Columbia, taxation was necessarily of an unusual order. In one of the chapters on the general history of the province[1] it was stated that taxation in the colony of British Columbia amounted to $100 per head. This was the result of a sparse population in a big, rough country, hard and expensive to administer. In a statement presented by E. G. Prior, the premier of the province, to the government at Ottawa in 1903, it was shown that at that time, taking municipal, provincial and Dominion impost, each person on the voters' list was on an average taxed to the extent of $100 per annum. We have already seen that in 1876 the Elliott government, to extricate the country from the financial slough into which it had fallen, found it necessary, in addition to a loan of $300,000, to resort to a system of direct taxation, which has been continued ever since. Land offered an easy source of ready money, and was for many years sold indiscriminately to purchasers instead of being administered upon some definite plan of settlement and development. Land, in a province 360,000 square miles in extent, was apparently plentiful and the treasury was always hungry. Changes in the Assessment Act and other acts affecting revenue were frequent. In the years from 1892 to 1913 inclusive there were seventy-five such acts. An attempt was made in 1878 to compel every Chinese person over twelve years old to take out a licence, for which ten dollars was to be paid quarterly, a measure which, for constitutional reasons, had to be abandoned. In 1880 the Assessment Act of 1876 was amended, raising the rate of the taxes which were not paid before June 30. In 1881 the school tax of three dollars was abolished, or rather its name was changed to 'revenue tax,' and under this name every male resident over eighteen years of age was made to pay it. The Roman Catholics

[1] See p. 170.

objected to paying a school tax which went into the consolidated revenue for public purposes, while at the same time they paid for the private tuition of their children in Catholic schools. The protest against the school tax by Catholics, which was largely sympathized with by members of the English church, was the nearest to an agitation for a separate school system to which the people of British Columbia ever came. If we except the royalty Governor Douglas endeavoured to collect on gold produced in the colony, the first mining tax created was in 1883, when one dollar per acre was imposed on mining claims in the province upon which $200 had not been expended in a single year.

The tendency was towards increased taxation and the creation of new sources of revenue. In 1887 the rate on real property was raised to two-thirds of one per cent; one-half of one per cent on personal property; three-fourths of one per cent on incomes of $1500 and over; the rate on wild land was raised from five cents to eight and one-half cents per acre. If the taxes were paid before June 30 the rates were to be one-half, one-third and one-half respectively, and seven and one-half cents on wild land. In 1887, too, the Assessment Act took cognizance of railways, and their property was assessed and taxed as realty, personal property, or wild land according to its character. In 1888 there was a consolidation of all previous acts. Minor amendments followed in 1889 and 1891. The rate of wild land was raised to two and one-half per cent on the assessed value. The first separate railway assessment act was passed in 1894, when the line, including sidings, etc., was assessed at $3000 a mile, the subsidy land being assessed as wild land and other real property as real property. In 1897 the Assessment Act was again changed, the rates going up to four-fifths of one per cent on real property, three-quarters of one per cent on personal property, and after allowing an exemption of $1000 on income a variable rate of from one and one-quarter to one and three-quarters per cent up to $20,000 and over. Three per cent was charged on the assessed value of wild land. Taxes paid before June 30 were allowed the usual reduction. The products of metalliferous mines were taxed one per cent on certified

returns of the value of the ore. In 1899 the taxation on mortgages or other encumbrances on real estate or personal property was abolished. This tax had been the subject of much agitation and protest. Equitably just in theory, in practice it meant that the mortgagee charged the mortgagor, the unfortunate borrower, with the tax. It was a political issue for several years, but upon the incoming of the Semlin administration Joseph Martin, the attorney-general, cut the Gordian knot by simply doing away with it altogether—a simple and expeditious method. The previous government needed the money it brought and hesitated to apply the ax. During the session of 1900 coal was taxed five cents per ton and nine cents per ton was imposed on coke. This was regarded as an act of grace on the part of James Dunsmuir, coal-mine owner, who was then premier. This tax was increased in 1908 to ten cents per ton on coal and fifteen cents per ton on coke. In 1900, too, a graduated income tax was adopted, with exemption on $1000, ranging from one and one-half per cent up to $5000 to three and one-half per cent on amounts to $40,000, and four per cent on all over that amount. There were the usual reductions for prompt payment. It was during this session that the famous two per cent tax on the gross output of mines, less cost of treatment and transportation to smelters, was imposed. It created a great deal of dissatisfaction among mining operators, and tremendous efforts were made to bring about its repeal or modification. Mining in the interior at that time was not in a prosperous condition. An eight-hour law had been passed during the Semlin régime, which greatly incensed the operators; miners were in a striking mood, and the price of silver and copper was low,—hence the depressed feeling which prevailed. But in time the eight-hour law and the two per cent tax, both of which stood, were quietly accepted. Politics forbade the repeal of the former; the need of revenue justified the latter. The following year, 1901, 'income' was segregated from 'personal property' and became a separate item of taxation, and for the first time corporations came on the boards for consideration. The legislature of 1903 imposed a tax of twenty-five cents per acre on all unworked, crown-granted mineral

claims. Provision was also made for an annual sale of lands for delinquent taxes, and where such sales were unsuccessful and no purchasers offered for the property, the land so offered became absolutely vested in the crown.

When the McBride government came into power the financial situation had become acute, the deficit for 1902-3 having been $1,348,552, the largest on record in British Columbia. The province had practically reached the limit of its borrowing powers, and the government bankers not only refused to enlarge the already very large overdraft, but demanded payment of loans made. It has already been seen that a short-term loan of $1,000,000 was arranged to tide over the crisis. It was necessary in the circumstances to increase still further the rate of taxation and invent new sources of revenue. To meet the situation the strictest economy was enforced in all departments, and appropriations were pared down to the lowest possible limit and a new assessment act passed. The rates were fixed as follows: one per cent on real property; five per cent on wild land; one per cent on personal property; on income in excess of the exemption of $1000—on class 'A,' not exceeding $10,000, one and one-half per cent up to $5000 and two and one-half on the next $5000; class 'B,' on $10,000 and not exceeding $20,000, two and one-half per cent up to $10,000 and three per cent on the next $10,000; class 'C,' on $20,000 and upwards, three per cent to $20,000 and three and one-half per cent on the remainder. These taxes, if paid before June 30, to be subject to a discount of ten per cent. Certain specified corporations, such as banks, fire and life insurance companies, guarantee loan and trust companies, telegraph, telephone, gas and water companies and electric lighting and power companies, were taxed one per cent on their gross revenue. The effect of the change in policy, together with, of course, the improvement in business conditions, was almost immediately seen in the large increases of revenue and the realization of surpluses. So soon, indeed, did good results follow that in 1905 it was felt that a reduction in taxation might take place, and a special tax commission was appointed to inquire into the incidence of taxation and other matters affecting

revenue. As a result of its recommendations some changes were made in the Assessment Act. Coal land and timber, which were formerly embraced in wild land, were made separate items of taxation. Coal land being worked was taxed at one per cent on the assessed value, and that simply held as coal land without being worked was taxed at two per cent. On timber land the tax was two per cent. Real property was reduced to the rate of three-fifths of one per cent and personal property to two-thirds of one per cent. Incomes were changed to: class 'A,' up to $2000, one and one-half of one per cent; class 'B,' over $2000 and not exceeding $3000, one and three-fourths of one per cent; class 'C,' over $3000 and not exceeding $4000, two per cent; class 'D,' over $4000 and not exceeding $7000, three per cent; class 'E,' over $7000, four per cent.

Several new departures were made in 1907. Salmon canneries were taxed two cents per case on the salmon pack, in addition to a tax on the cannery and machinery, which are assessed at $10,000 for a one-line cannery, $15,000 for a two-line cannery, and $30,000 for a four-line cannery. The assessment on railways was raised and fixed at $10,000 per mile for the main line and branches, and for sidings, spurs and switches $3000, and the rate thereon at one per cent.

In 1910 another amendment to the Assessment Act was passed whereby the rates of taxes were again reduced—real property to one-half of one per cent; personal property to one-half of one per cent; and incomes under class 'A' up to $2000 one per cent, class 'B' up to $3000 one and one-fourth of one per cent, class 'C' up to $4000 one and one-half of one per cent, class 'D' up to $7000 two per cent, and class 'E' over $7000 two and one-half of one per cent; and the tax on wild lands to four per cent on the assessed value. Banks, instead of being placed under the category of income, were charged a flat rate, the head office in the province being taxed $1000, and for every other office or branch in the province (including those in municipalities) $125. Fire insurance companies were taken out of the class of corporations assessed under the Assessment Act and a special tax of two per cent on the gross premiums on business done in the pro-

vince was levied by the Fire Insurance Act under the supervision of the superintendent of insurance.

This brings us up to a period when, on account of the inflow of revenue, it was considered an opportune time to examine the situation comprehensively with a view to a general reduction of imposts. Accordingly in 1911 a royal commission was appointed to inquire into the question of taxation as it affected the revenue of the province. After due investigation a report was made, and the recommendations have, as a matter of policy, been accepted by the government, but with one exception have not yet been carried into effect. During his budget speech of 1913 the minister of Finance made the following announcement:

> The Royal Commission on Taxation made four important recommendations: namely, the abolition of the poll tax; the exemption of improvements from taxation; the abolition of the personal property tax and readjustment of the income tax, and various minor changes to which I need not refer in detail. The government, after careful consideration, decided that to adopt all these recommendations at once would involve too great an immediate loss of revenue. By the bill before the House, which I introduced the other day, we propose now to abolish the poll tax, which involves a loss of revenue to the extent of about $350,000, and it is proposed in two years' time to exempt improvements from taxation. In four years it is proposed to abolish the tax on personal property and rearrange the incidence of income tax, endeavouring as far as possible to adopt the whole of the recommendations of the tax commission. Our aim is as soon as possible, by easy stages, to reach a point where direct taxation will be eliminated and our revenues will be obtained from natural resources of the province.

In addition to the other forms of provincial taxation, the Public School Act provides for a school tax to be levied in rural school districts, which tax, for convenience, is collected by the provincial collectors and turned over to the local school boards. The rate, of course, varies in each district according to requirements.

There are also royalties on timber, which up to 1913 were fifty cents per thousand feet on timber cut from all lands, except the old crown-granted lands, and twenty-five cents per cord on wood cut from similar lands. However, the latest legislation has brought into existence a scale of royalties too elaborate to be detailed here, but considerably increasing the rate.

The province enjoys a very large revenue from probate and succession duties. Succession duties are incident upon estates valued at over $5000 and according to the relationship of heirs, of which there are three classes. The nearest relationship involves a duty of from one and one-half per cent to five per cent on amounts over $200,000 ; the second relationship involves a flat rate of five per cent ; and the third, ten per cent.

All taxes and all revenues, including the proceeds of loans, are paid into and form part of the consolidated revenues of the province to be appropriated for public purposes.

The following exemptions are allowed under the Assessment Act : on mortgages, as personal property ; on the unpaid purchase-money of land, as personal property ; on household furniture and effects in dwelling-houses ; on homesteads under the Dominion Land Act, and on pre-emptions under the provincial Land Act, for two years from date of entry and to the amount of $500 for four years thereafter ; on farm produce and on live-stock and machinery on the farm up to the value of $1000, and on all income from the farm. There are also certain exemptions from personal property tax on certain forms of property which are taxable or contribute revenue in other ways.

For the purpose of taxation the province is divided into assessment districts, an assessor and collector being appointed. He makes an annual revision of the rolls and is bound to fix the assessed value at the actual cash value of the property. Each taxpayer has the right of appeal against the assessment to the court of revision. In addition to the liability of property for taxes there is also a personal liability. The latter provision, however, is seldom, if ever, taken advantage of.

General Legislation respecting Municipalities

Turning now from provincial affairs to municipal affairs, the general legislation in force respecting municipalities is contained in three statutes passed during the session of 1896, known as the Municipal Incorporation Act, the Municipal Election Act, and the Municipal Clauses Act and amendments, dealing respectively with municipal corporations, elections, and government and internal management. The provisions contained in these acts conserve the corporate rights, powers, and liabilities of municipalities then existing.

As was stated in a former part of this article, municipal administration in the Province of British Columbia is carried on along very much the same lines as in the other provinces of the Dominion, more particularly Ontario, upon whose statutes a good deal of the western legislation is founded. Very material departures, however, have been made to suit local conditions.

Under the first-mentioned act a city municipality—and in British Columbia there are no classifications as to cities, towns and villages—to include a tract of land of not more than two thousand acres in area, may be incorporated by letters patent upon petition signed by the owners of more than one-half in value of the lands within the proposed boundaries, if within such boundaries there are resident at the date of the first signature to the petition not less than one hundred male British subjects of full age; and a township or district municipality upon petition by the like proportion of owners (including holders of pre-emptions of at least one year's standing), if not fewer than thirty British subjects of full age have been residents of the area proposed to be included in the municipality for not less than six months before the date of the first signature to the petition. There are also provisions for securing an extension or reduction of corporate limits or for the dissolution of a municipal corporation upon petition of the ratepayers.

The Elections Act, as its name would indicate, codifies

the provisions relating to elections. The annual election is held on the second Monday in January, and the polling on the Thursday following in the case of a city municipality, and on the Saturday following in the case of a district municipality. The details of voting are practically the same as in all the other provinces. A candidate for a mayoralty must be a British subject and must have been registered as the owner of property to the extent of one thousand dollars in assessed value above any registered encumbrance or judgment. An alderman must be a British subject with a similar property qualification to the extent of five hundred dollars. In district municipalities, to qualify as reeves and councillors the candidates are required to be the possessors of five hundred dollars and two hundred and fifty dollars respectively, over and above encumbrance. All civic officers and employees are elected at regular meetings and hold office at the pleasure of the council. Municipalities are divided into wards to allow equal representation as nearly as may be on the basis of assessed values, and a redivision on this basis is necessary when the amount of assessed property in any ward exceeds in proportion to its representation in the council more than forty per cent of the assessed property in any other ward. The qualification for electors is as follows: any male or female, being a British subject of the full age of twenty-one years, who in city municipalities has paid on or before November 1, and in district municipalities before November 30, prior to the date of nomination, all rates, taxes, fees, imposts, etc., is qualified to vote at the municipal elections, (*a*) who is a landowner of the assessed value of at least one thousand dollars; (*b*) who is the holder of a trade licence, the annual fee for which is not less than five dollars; or (*c*) who is a householder.

The Municipal Clauses Act, continuing and elaborating the policy of the former municipal acts, has for its object the creation of a comprehensive system of municipal government and management, altogether self-supporting. Councils under authority of this act have very wide legislative and executive powers, the scope of which corresponds in a great measure with that of municipalities in Ontario. Munici-

palities have almost complete self-government within the limits of the municipality, but as a partial limitation of this authority the government may from time to time appoint auditors for the municipalities to audit the accounts, and the government may also appoint a commission to inquire into the conduct of any part of the public business in a municipality and the administration of justice therein.

The development of the municipal system in British Columbia for the first thirty years after Confederation was rather slow, but since about 1900 it has been greatly accelerated as a result of business expansion generally in the interior, and of mining development and the construction of railways. There are at the present writing (1913) sixty-one municipalities in existence, twenty-eight of which are rural and thirty-three urban, but the total area contained within their boundaries forms only a very small part of the total area of the province. All territory outside these municipal areas is under direct provincial jurisdiction as to taxation and otherwise.

Municipal Finances

The revenue for the year ending December 1912 on the rural municipalities amounted to $5,801,476, and the expenditure to $5,646,817. The revenue of urban municipalities amounted to $10,528,026, and the expenditure to $9,976,981, giving a total municipal revenue of $16,329,502 and an expenditure of $15,623,798. The bonded indebtedness was: rural, $15,448,311; and urban, $39,786,456, making a total municipal bonded indebtedness of $55,234,767. The taxable value of rural municipalities amounted to $159,404,751, and of urban municipalities to $280,876,475, or a total of $440,281,226. These figures show a remarkable expansion since 1897, when the first municipal returns were made public. At that time there were twenty rural municipalities and eleven urban with a total revenue as follows: urban, $1,501,607; rural, $225,872. The expenditures were: urban, $1,400,500; rural, $202,033. The bonded indebtedness was:

urban, $5,044,684; rural, $508,963. The taxable value of property was: urban, $35,633,743; rural, $12,338,609.[1]

For the purpose of taxation land and improvements are estimated at their value, a measure of which as to land is actual cash value; and as to improvements, the cost of placing at the time of the assessment such improvements on the land, having regard to their then condition. Land and improvements are assessed separately. The rate levied shall not exceed one and one-half cents in the dollar, in addition to what is required for the board of health, hospital purposes, school purposes and for payment of interest on sinking fund or any debt of the municipality. Wild lands within the limits of a municipality may be taxed, but not to exceed four per cent of their assessed value. Councils have power to levy a special rate of not more than one mill in the dollar for board of health purposes and not more than five mills in the dollar for school purposes; and the councils, in addition, have the right to apply any portion of the ordinary revenue for school purposes. All details as to assessment, return of rolls, appeal to the court of revision, etc., are similar to those which obtain elsewhere in Canada. Every male resident over twenty-one years of age is liable for statute labour, which may be one day's labour for every five hundred dollars assessed value of real property in the municipality, but which, in the discretion of the council, may be reduced by by-law in rural municipalities. In cities and rural districts the statute labour may be commuted for two dollars per day. Municipalities have

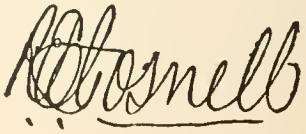
[1] FINANCIAL STANDING OF THE LARGER CITIES IN 1912

	Revenue	Expenditure	Bonded Indebtedness	Taxable Assessed Value
	$	$	$	$
Vancouver	4,008,762	3,492,502	20,426,351	138,557,595
Victoria	3,364,742	3,320,254	8,019,953	71,670,770
New Westminster	598,797	595,849	4,038,500	13,556,825
Vernon	391,019	387,320	639,560	3,358,259
Kamloops	355,412	354,957	563,873	3,733,615
Prince Rupert	275,183	274,066	1,631,732	16,016,055
Nelson	235,000	240,000	661,000	3,891,430
Kelowna	233,867	226,414	343,500	2,453,575
Nanaimo	233,420	275,053	603,514	2,514,000

the power to abolish statute labour by by-laws, and, if abolished, the council must expend on the road in which the assessed property is situated an amount equal to thirty per cent of the tax collected on that land. Among the list of exemptions are buildings for public worship, burying grounds, public and private hospitals, municipal property, property vested in His Majesty, orphanages and institutions for destitute children.

The recent interest taken in the question of the exemption of improvements from taxation, and which the single-tax advocates claim as the thin end of the wedge of their theory, is not new to the municipal organization in British Columbia. The Municipal Act has for many years prevented the municipalities from taxing improvements for more than fifty per cent of their value and has also permitted the municipal councils to exempt improvements altogether from taxation. The rural municipalities—Coquitlam, Langley, Oak Bay, Peachland, Salmon Arm, Summerland—were the first to exempt improvements from taxation, and now the urban municipalities of Vancouver, Victoria and Prince Rupert have followed their example. The total amount of taxes collected by the urban municipalities in 1910 was $33,137,239, and the total collected by the rural municipalities in that year was $481,901.

Public administration, on the whole, has been creditable to the province. Many mistakes were made at the outset, as was inevitable; and the progress of affairs was greatly hampered by lack of funds to meet the requirements of a province heavily handicapped by physical conditions, want of interior communication and practical isolation from the rest of the world. Taking the long list of administrations since 1871, there have been few scandals or abuses which reflected on the personal honour of members of the executive, and none serious in their character. The administration of justice has been firm and effective. In most respects, if not all, administration has been progressive.



HISTORY OF
THE JUDICIAL SYSTEM

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HISTORY OF THE JUDICIAL SYSTEM

Before Confederation

THE searcher for the 'beginnings of things' relating to the administration of justice in the region west of the Rocky Mountains finds himself, somewhat to his surprise, in the city of Montreal at the opening of the last century, and face to face with the hot rivalry of the old fur-trading companies. The story of their strife for the supremacy of the West is told in other places in these volumes.[1] Montreal was the head-centre of 'certain Associations of Persons trading under the name of the North-West Company of Montreal,' commonly styled the Nor'westers. These were long a thorn in the flesh to the older Adventurers of the Hudson's Bay Company. The factors and traders of the Nor'westers were the first to establish posts beyond the Rockies, and it was one of them, Alexander Mackenzie, who first reached tide-water on the Pacific coast 'from Canada by land' in 1793. To strengthen their position in the constant disputes with the traders of the Hudson's Bay Company the Nor'westers stole a march on their rivals. All-powerful in Montreal, controlling the executive council of Lower Canada through their partners and friends in that body, and in high favour with the governor, they were able to procure presentments from Montreal grand juries complaining bitterly of the outrages perpetrated by the employees of the older Adventurers upon the poor traders from Canada. These being laid before the home authorities by the governor of Lower Canada resulted in the passage in 1803 of the first act for the administration of justice in the West.

The courts of Upper and Lower Canada were given juris-

[1] See 'The Period of Exploration' in this section, pp. 61-2.

diction to try persons accused of crime in the Indian territories to the north and west of the two Canadas; and the governor of Lower Canada was empowered to appoint justices of the peace throughout this region for committing offenders until conveyed to Canada for trial; and these justices would naturally be the factors and superior employees of the Nor'westers. Still the strife went on, and in 1821 this was the contemporary statutory record: 'The Animosities and Feuds arising from such Competition have also for some years past kept the Interior of *America* to the Northward and Westward of the Provinces of *Upper* and *Lower Canada* and of the territories of the United States of *America* in a state of continued Disturbance; and many Breaches of the Peace and Violence extending to the Loss of Lives and considerable Destruction of Property have continually occurred therein.' This is part of the preamble to an act of that year which followed the amalgamation of the two rival companies. The provisions of the earlier act were extended and strengthened, and henceforth the Hudson's Bay Company not only held the exclusive right to trade, but also controlled the administration of justice throughout all the West to the Pacific coast. But though notable trials took place in Montreal and Toronto under these statutes, the annals are silent as to the exercise of jurisdiction by the Canadian courts in any case from beyond the Rockies.

When next the curtain rises James (afterwards Sir James) Douglas is chief factor on the Pacific coast for the Hudson's Bay Company, holding also Her Majesty's commission as governor of Vancouver Island. In 1849 the old statutes, the tenor of which has just been indicated, had been repealed so far as Vancouver Island was concerned; and the crown was empowered to make provision for the administration of justice in the island and for that purpose to establish courts with such jurisdiction in matters civil and criminal as Her Majesty might think fit, and to appoint the necessary 'Judges, Justices, and such ministerial officers for the administration and execution of justice in the said Island as Her Majesty shall think fit and direct.' Beyond the appointment of Dr Helmcken (son-in-law to Governor Douglas) as a justice of

the peace, nothing was done toward establishing a regular court until the end of 1853. In March of that year Governor Douglas, writing home, expressed a feeling of diffidence as to his ability to discharge the duties of his office, 'while I have no assistance whatever in the administration of public affairs, and while every function of the government, whether military, *judicial*, executive or clerical must be performed by me alone.' He intimates, however, that he will do his best, 'trusting that you will forward from time to time such instructions as may be necessary for my guidance, and a selection of legal works containing the forms of process observed in the Vice-Admiralty Courts and developing the principles on which their decisions are founded.'

On December 2, 1853, the governor undertook to establish the Supreme Court of Civil Justice of Vancouver Island, and to the office of judge of that court appointed his brother-in-law, David Cameron,[1] at a salary of £100 per annum. Confirmatory of the governor's action, Her Majesty, by order-in-council of April 4, 1856, formally created the court under the name chosen by the governor; and by royal warrant on May 5 Douglas was authorized to issue letters patent to David Cameron as Chief Justice of the Colony of Vancouver Island. Certain doubts as to criminal jurisdiction were removed by a later commission of April 2, 1860.

There are no published reports of litigation in those early days, and we get occasional glimpses only of Chief Justice Cameron's work. The early settlers seem to have been in constant feud with the officers of the Hudson's Bay Company, and complaint was made of unfair treatment in certain libel proceedings heard before the chief justice, but of his desire to make proper disposition of such little business as came before him there seems to be no doubt. In 1865 he was retired on a pension of £500 per annum, being succeeded by the Hon. Joseph Needham, who held the position of chief justice of Vancouver Island until his resignation in March 1870, upon his transfer to the chief justiceship of Trinidad.

Meanwhile the rush of gold-seekers to the upper reaches of the Fraser River had necessitated the establishment in

[1] See p. 118.

1858 of a new colony upon the mainland. Theretofore, under the name of New Caledonia, the regions west of the Rocky Mountains had remained, so far as concerned the administration of justice, subject to the provisions of the old statutes of which mention was made in the opening paragraphs of this article. These were now repealed as to the new colony, to which the name British Columbia was given. Douglas was its first governor and for some years its sole lawmaker. To his assistance was sent out an English barrister, Matthew Baillie Begbie, of Lincoln's Inn, with a commission dated September 2, 1858, as 'a Judge in our Colony of British Columbia.' Douglas was now governor of both colonies, and he was told that although Judge Begbie was 'invested with the very important office of judge, he will nevertheless have the kindness, for the present at least, to lend you his general aid for the compilation of the necessary laws and other legal business. This is the more proper duty of an attorney-general; and should the colony advance, as seems at present possible, the services of such an officer will no doubt be urgently required.' The governor and the judge both found it more convenient to reside at Victoria, the capital of the island colony, and the governor issued the necessary proclamation to enable the judge to transact in Victoria most of the legal business of the mainland colony other than actual trials. At Fort Langley, on the banks of the Fraser River, on November 19, 1858, the governor and the judge took the necessary oaths of office; and the law of England as of that date was proclaimed as the law of the new colony. It may here be mentioned that after the union of the island and mainland colonies into the present Province of British Columbia in 1866, this date (November 19, 1858) was fixed as the date on which the civil and criminal laws of England 'so far as the same are not from local circumstances inapplicable' should be taken to have been introduced into the province.

By proclamation of June 8, 1859, Governor Douglas constituted the Supreme Court of Civil Justice of British Columbia and ordained that it 'shall have complete cognizance of all pleas whatsoever, and shall have jurisdiction in

CLINTON, B.C., CARIBOO ROAD

all cases civil as well as criminal arising within the said colony of British Columbia.'

For thirty-six years Sir Matthew Begbie (to give him the title bestowed upon him in 1874 and by which he is best known in British Columbia) was the most outstanding figure in the judicial history of the West. It is difficult to overrate the worth of his services to the province. Holding court with more or less regularity on the lower mainland, first at Fort Langley, afterwards at New Westminster, he journeyed from time to time into the mining camps of the interior. We catch glimpses of the roaring waters of the Fraser cañon, and we can see the fine dust of the old Cariboo road settling down upon the little cavalcade as the judge with his pack-train pushed through to Clinton, Barkerville, Quesnel Forks and other mining camps. He seems to have intuitively appreciated the spirit of the West and to have known just where to draw the line between the licence that is seemingly inseparable from life in mining camps and the lawlessness that it is the duty of courts to suppress. Lawlessness he did suppress, and with a thoroughness which made his name the synonym for law and order throughout the province. The stories told of him are innumerable. One, indicative of his zeal in upholding the dignity of the court over which he presided, is perhaps worth embalming. A miner who had indulged too freely in the somewhat dubious whisky of the camps proceeded to make 'rough house.' In the morning he acknowledged his guilt before Judge Begbie, who apparently was inclined to look leniently upon the escapade, no serious damage having been done; whereupon this dialogue ensued:

> *The Judge*: 'I 'll just fine you five dollars.'
> *The Culprit*: 'All right, jedge, I 've got it right here in my pants.'
> *The Judge*: 'And three months in gaol! Have you got *that* right there in your pants?'

On November 17, 1866, the two colonies were united under the name of British Columbia. The two courts, however, were not at once amalgamated. In 1869 the name of the island court was changed to the Supreme Court of Vancouver

Island, and its chief justice was to be known as the Chief Justice of Vancouver Island, while the mainland court was to be known as the Supreme Court of the Mainland of British Columbia, and its judge was to be styled the Chief Justice of the Mainland of British Columbia. The two chief justices were empowered to act for each other on request. Provision was also made that upon the death or resignation of either of them the two courts should be merged into one and that the surviving or continuing chief justice should be the Chief Justice of British Columbia, and thereupon a puisne judge was to be appointed to assist in the administration of justice.

In the following year (1870) Chief Justice Needham resigned, as already indicated, and the contemplated merger took place. Henry (afterwards Sir Henry) Pering Pellew Crease was commissioned as the first puisne judge of the Supreme Court of British Columbia on March 11, 1870. After twenty-six years of honourable service he received knighthood at the New Year of 1896, resigning his judgeship shortly afterwards.

After Confederation

This was the position when British Columbia entered the Confederation on July 20, 1871. The Supreme Court of British Columbia possessed the usual wide jurisdiction of a superior court both at common law and in equity. There had been some doubt as to the jurisdiction in bankruptcy, but this had been removed by local legislation before Confederation. In 1877 it was held that the court possessed jurisdiction in divorce and matrimonial causes under the English act of 1857, passed, it will be noticed, the year before the date fixed for the introduction of English law into British Columbia. This jurisdiction continued to be exercised, with some misgiving, until 1908, when the Privy Council finally put an end to all doubt upon the subject and affirmed the jurisdiction of the British Columbia court. It may be added that the work of the court along this line, though increasing in volume with the growth of population, is not as yet excessive; but the court is much hampered by the fact that

the procedure must follow the lines of the English legislation of 1857, subsequent English amendments and improvements not having been introduced into British Columbia. Jurisdiction upon this subject is thought to be exclusively with the Dominion parliament, and the difficulties in the way of legislation upon it from that quarter are well known.

As to the pleading and practice of the court generally, it may be said that the example of the courts in England has been followed from the beginning. The common law procedure acts formed the basis until 1879, when the practice under the English judicature acts was introduced, with, of course, some local modification, and that is the position to-day. Until 1879 the judges had had almost complete control of the court's procedure, being expressly empowered to make 'Rules of Court' to that end as might from time to time seem advisable. In 1879 the provincial legislature took from the judges this power and conferred it upon the lieutenant-governor in council. At the same time they made provision for dividing the province into judicial districts, a decentralizing measure which, as the judges complained, would send some of them into banishment to remote sections of the interior. One cannot read the judgments in the 'Thrasher' case in 1882, as reported in the British Columbia Law Reports, without seeing that there was a battle-royal between the legislature and the judiciary of the day. In the end the legislature won a notable victory, the Supreme Court of Canada on June 10, 1883, certifying to the governor-general in council its opinion, upon all points upholding the validity of the provincial legislation. It may be added that to this day the procedure and practice of the courts in British Columbia are in the hands of the lieutenant-governor in council, subject of course to any express provision the legislature may from time to time see fit to make. The decentralizing policy embarked upon in 1879 has had no practical fruition, the various Dominion governments having steadily refused to recognize the right of a province to affix conditions as to the place of residence, etc., of the judges, whose appointment rests with the federal authorities under the British North America Act.

As early as 1860 provision was made on Vancouver Island

'for rendering the administration of justice in minor criminal cases more speedy and certain,' and in 1866 an act was passed 'to facilitate the recovery of small debts and other demands.' Upon the mainland a proclamation of Governor Douglas known as the Goldfields Act of 1859 gave wide jurisdiction to gold commissioners in all mining disputes. To a large extent this jurisdiction still subsists under the present mining laws of the province, although what may be called the more purely judicial jurisdiction rests largely with the county courts of the province, concurrently, of course, with the Supreme Court. As early as 1859 jurisdiction was conferred by Governor Douglas upon local magistrates to hold courts for the recovery of small debts, and from this has gradually grown the present system of small debts courts.

Prior to Confederation there were so-called county courts presided over by stipendiary magistrates, but it is not deemed necessary to enter upon details. Under the British North America Act the appointment of county court judges rests with the federal authorities, and from time to time new county court districts have been designated under provincial legislation. In 1867 the English acts respecting county courts were adopted in British Columbia so far as applicable to the colony, and this policy has been followed to the present time. County court practice as well as Supreme Court practice follows in the main the English model.

A word as to the legal profession in this province may not be amiss. Henry Pering Pellew Crease was the first practising barrister, and he did not arrive in Victoria from England until toward the end of 1858. Judge Begbie was therefore obliged to permit of some latitude, and for a time any one entitled to practise before the Supreme Courts of the various United States was allowed to represent suitors before the courts of the two British colonies. This state of affairs was, however, but temporary, and from the beginning members of the legal profession have been considered as officers of the court over whom the court could exercise summary jurisdiction. In this respect, however, the history of the legal profession in British Columbia does not differ essentially from that of the older provinces. All barristers and solicitors

are members of the Law Society of British Columbia, which exercises a wide disciplinary jurisdiction over the profession subject to a modified right of appeal to the Supreme Court of British Columbia. A person upon undergoing the prescribed course of study and service and passing the necessary examinations may become either a barrister or a solicitor, or both; but of course only a barrister may appear in court.

The jury system still bears the imprint of early days in the province. British subjects were somewhat scarce in the mining camps, and the difficulty was met by a proclamation in 1860 under which the sheriff was empowered to summon in addition to such British subjects as were available such other grand and petit jurors as he saw fit, 'whether British subjects or not, without regard to any property qualification.' Twelve jurymen were and have always been required in criminal cases, but seven or more might sit on civil cases if the judge certified that twelve could not be procured conveniently. Civil cases are now regularly tried before a jury of eight, who must, however, be British subjects except in remote districts where the old rule still obtains. If at the end of three hours' deliberation the jury fail to agree, the court may receive the verdict of three-fourths; but this rule does not apply in actions for the recovery of penalties or forfeitures by or on behalf of the crown.

In 1907 the work of the Supreme Court had so increased in volume that it was deemed necessary to establish a Court of Appeal for the province. Theretofore the judgments of single judges were subject to review before the full court, comprised of not less than three of the other judges of the Supreme Court. Appeals from the various county courts were also heard by the same tribunal. The act establishing the Court of Appeal did not come into force until September 1, 1909. Since that date the judges of the Supreme Court of British Columbia are judges of first instance only.

At the present time, therefore, the courts of the province in the order of authority are as follows:

1. The Court of Appeal, consisting of the chief justice, who is at present styled the Chief Justice of the Court of Appeal, and four puisne justices styled Justices of Appeal.

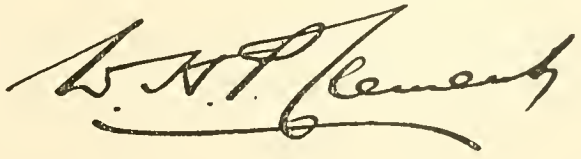
So soon as the present chief justice of British Columbia ceases to hold that office, the chief justice of the Court of Appeal will assume the title of Chief Justice of British Columbia. In explanation of this provision it may be stated that the present chief justice of British Columbia (the Hon. Gordon Hunter) held that office prior to the establishment of the Court of Appeal, and he still retains his position as head of the judiciary of the province. As already intimated, the appellate jurisdiction of this court is wide, covering: appeals from all judgments and orders of the Supreme Court, whether final or interlocutory; appeals from the county courts, whether final or interlocutory, in all cases, speaking roughly, where the amount involved is over one hundred dollars, and by special leave in cases involving less than that amount; appeals from the opinion of a judge of the Supreme Court on 'constitutional questions' referred to him by the lieutenant-governor in council; appeals from every decision in any of the following matters: certiorari; quo warranto; mandamus; prohibition; case stated under the Summary Convictions Act; or any point of law arising on an appeal to the county court under the last-mentioned act. It is also the Court of Appeal for the province in all criminal cases under the criminal code of Canada. The Court of Appeal sits four times a year; in January and June in Victoria and in April and November in Vancouver.

2. The Supreme Court of British Columbia, consisting of a chief justice and five puisne justices styled Judges of the Supreme Court. The jurisdiction of the court both civil and criminal has been already sufficiently indicated. In addition to its general jurisdiction throughout the province as a Superior Court of Record—a jurisdiction, it may be mentioned, exercisable by each individual judge as and for the court—there are certain appeals under provincial legislation which are heard before the Supreme Court judges. These are chiefly from departmental officers, such as gold commissioners, mining recorders, and registrars of land titles. The court, it may be added, sits daily in Victoria and Vancouver, and there are regular sittings twice a year or oftener at various other places throughout the province.

3. County Courts, of which there are now nine: Victoria, Nanaimo, Vancouver (three judges), Westminster, Yale (two judges), Cariboo, Atlin, Kootenay, and West Kootenay. These courts cannot hear any action for malicious prosecution, libel, slander, criminal conversation, seduction or breach of promise of marriage, or against a justice of the peace for anything done by him in the execution of his office. Subject to these exceptions the county courts have jurisdiction in all personal actions where the amount involved does not exceed $1000; in actions of ejectment where the value of the premises does not exceed $2500; in equity cases, such as administration, execution of trusts, proceedings upon mortgages, specific performance, the winding-up of partnerships, suits relative to water rights, probate, etc., where the amount involved does not exceed $2500. In addition to the above these courts have a wide jurisdiction under provincial mining acts, and upon appeals from summary convictions and from Small Debts Courts. The county court judges also sit in the County Court Judges Criminal Court under the criminal code of Canada. The administration of criminal justice is indeed largely in their hands, as only capital cases and cases in which the accused elect to be tried by jury come before the Supreme Court judges at the various assizes throughout the province.

4. Small Debts Courts, with jurisdiction in personal actions up to one hundred dollars. These courts are presided over by judges appointed by the provincial government, and there are many of them throughout the province.

In addition to these regularly constituted courts there are, of course, many stipendiary magistrates and justices of the peace, exercising a more or less limited jurisdiction under the criminal code of Canada as well as under the provincial Summary Convictions Act. In these matters British Columbia differs in no essential respect from the other Canadian provinces.



HISTORY OF EDUCATION

HISTORY OF EDUCATION

I

VANCOUVER ISLAND AND BRITISH COLUMBIA BEFORE THEIR UNION

IN 1849 Vancouver Island and its dependencies were separated from the as yet unorganized Indian territories on the mainland and became a separate colony under the Hudson's Bay Company. An attempt was then made by the company to provide an education for the children of its employees and for those of the few settlers who had been induced to take up land in the district surrounding Fort Victoria. The first teacher (who also performed the duties of chaplain) sent to the colony was the Rev. Robert J. Staines, a graduate of Trinity College, Cambridge, who with his wife landed in Victoria in 1849. Victoria was then in a most primitive condition. According to a report of one of the officials of the Hudson's Bay Company:

> At this time there were no streets in Victoria and the traffic had cut up the thoroughfares so that every one had to wear sea-boots to wade through the mud. Planks were laid through the mud in order to get the teacher and his wife safely to the fort. They looked around wonderingly at the bare walls of the building and expressed deep surprise, stating that the Company in England had told them this and that, and had promised them such and such. Mr Staines had been guaranteed £340 a year for keeping a boarding-school and £200 as chaplain. The services were carried on in the mess-room of the fort, which was made to serve for almost every purpose. Here also was erected a temporary pulpit and prayers were held every Sunday. At this time Staines purchased some land on the same condi-

tions as others. But he too became much dissatisfied with things, with Douglas and his administration as Governor of the Colony.

The few settlers then living on Vancouver Island were at variance with the governor and officials of the Hudson's Bay Company, and Staines espoused the cause of the settlers. The lot of this handful of people finally became so intolerable, as they alleged, that it was resolved in 1853 to send Staines to England to endeavour, if possible, to secure from the imperial government some measure of justice. Staines's fatal habit of procrastination cost him his life. The ship that was to carry him from Sooke to San Francisco sailed without him. He embarked on the next ship, a vessel heavily laden with lumber. When off Cape Flattery a storm struck her, throwing her on her beam ends. Her crew were at once swept overboard. Staines was in his cabin and, after vainly endeavouring to cut his way through the side of the ship, he perished from cold and exhaustion.

Two years passed before a successor to Staines arrived in Victoria. On September 13, 1854, the Rev. Edward Cridge accepted the terms and conditions specified below, and sailing from England landed at Victoria on April 1, 1855.

> The Hudson's Bay Company are desirous of sending out a clergyman to Vancouver Island to be stationed in the vicinity of Victoria the principal establishment in the island. He will have charge of a district or parish and in addition will hold the appointment of chaplain of the Hudson's Bay Company and will attend to the spiritual wants of the free settlers and of the officers, clerks and servants of the Hudson's Bay Company stationed at Victoria and at the various farms in the neighbourhood.
>
> The church is in progress of construction, in the vicinity of the fort, and will probably be completed by the time the clergyman may be expected to arrive at the island. The Hudson's Bay Company propose that the remuneration for these services shall consist: first, of a parsonage and glebe of one hundred acres, of which thirty acres will be cleared and put into a cultivable shape; secondly, of a stipend of £300 per annum charged, with the sanction of the Colonial Office, on

the fund arising from the sales of land—of which funds the Company are trustees ; thirdly, of an allowance of £100 per annum from the fur branch of the Company, for acting as Chaplain to the Company and attending to the wants of the servants.

Until the house is finished, quarters will be provided for the clergyman in the fort. And till the land is put into a proper state of cultivation, rations will be allowed to him and his family, as provided for the officers of the Company. When the land is taken possession of by him, he will be expected to provide for himself.

The Company think it very desirable that the clergyman should, as is done at Red River by the Bishop of Rupert's Land, take charge of a boarding-school, of a superior class, for the children of their officers, and would wish that he would take out with him a gentleman and his wife capable of keeping a school of this nature.

The fur-trade branch would find a school-house and residence for the master and his family and will vote an annual grant of £100 in aid of the school. Should they give satisfaction to the gentlemen in the country they might expect from thirty to forty pupils, and the usual payment for each pupil would be £20 per annum for board, lodging and education.

A free passage will be allowed from London to Vancouver Island for the clergyman, his family and servants, and also to the school-master and his family.

It is understood that the engagement shall be for five years, at the expiration of which a free passage home will be granted, should the clergyman wish to return ; or on the contrary, a fresh engagement may be entered into. It is also to be understood that in the event of misconduct, the engagement may at any time be cancelled, on the recommendation of the Governor of Vancouver Island, and with the sanction of the Secretary of State for the Colonies.

The part of the agreement stipulating that a school-master and his wife should come out with Cridge appears not to have been carried into effect. Mrs Cridge, however, opened a private school for the children of the Hudson's Bay Company's officials and had the unique honour of having organized the first Sunday-school in British Columbia.

Public schools, but not free public schools, were opened in Victoria, Craigflower and Nanaimo under Cridge as acting superintendent of education, as appears from a report drawn up by him on August 27, 1861, and submitted to Governor Douglas. The report is as follows :

> SIR,—I have the honour to submit, for the information of His Excellency the Governor, the accompanying report on the state of the Colonial Schools :
>
> *1st.* Victoria School, Mr W. H. Burr, master. The sixth annual examination of this school took place on the 16th of July ultimo, at which fifty-three pupils were present, and fifteen boys received prizes, donations of His Excellency the Governor.
>
> The subjects of examination will be found in Schedule No. 2. Very satisfactory progress was manifested in some of the advanced subjects, particularly in Book-keeping, and the school at large was being well founded in the elementary subjects, especially in reading and orthography.
>
> I consider the school in a generally satisfactory condition, and, seeing that there is but one teacher to fifty pupils, doing its work well. The chief defect observable is some want of uniformity and punctuality in attendance, the remedy for which perhaps rests more with the parents than with the teacher.
>
> The school room is also too small for the number of pupils frequently in attendance. The house, which consists of eight rooms, as well as the premises generally, is in fair repair.
>
> Of the ten acres of which the School Reserve consists, a portion of six acres is enclosed, and four acres under cultivation by the teacher.
>
> As some inconvenience has been alleged with regard to the distance of this school from the town, I would observe that it is situated at a distance of 300 paces beyond the boundary of the town, and there is a good foot-path to within that distance of the school, constructed last year for the benefit of the scholars, by the Commissioner of Police, A. F. Pemberton, Esq., by private subscription and by the labour of prisoners.
>
> The remainder of the road is in the winter rough and inconvenient, but at a very little expense a good pathway could be extended the whole distance. It would be for

the benefit of Education that this should be done before the winter, either by the Government or by subscription. The almost nominal rate ($5 or 20s. per annum) at which instruction at a really useful school is given, might be an inducement to parents and others to contribute to its improvement in this and other respects.

2nd. Craigflower School, Mr H. Claypole, teacher. The sixth annual examination of this school was held on the 11th of July, ult., at which twenty-one pupils were present. Prizes, the gifts of His Excellency, were awarded to three boys and two girls.

Great pains has evidently been taken with the scholars during the past year. They are well grounded in the elementary subjects, and some of the elder pupils displayed considerable aptitude in Geography, Grammar and Arithmetic.

This school is well situated for the population growing in the neighbourhood, and is, I feel sure, conferring important advantages on the community. The school-house, which contains six rooms, and the premises generally, need considerable repairs. The School Reserve consists of five acres ; no portion is at present under cultivation.

3rd. Nanaimo School, Mr C. Bryant, master. Of the children in this school there are eighteen not exceeding seven years of age. I have not had an opportunity of visiting it recently, but from frequent communications with the teacher, and information derived from other sources, I have reason to believe that Mr Bryant continues to display the same assiduity in the discharge of his duties as heretofore.

From the teacher's report it appears that the school-house, which consists of four rooms, needs some repairs.

The following schedules will afford more detailed information on the points to which they refer.

The period to which these returns relate is the year ending July 1861.

Attendance—number now on the books

	Male	Female	Above 10	Under 10
Victoria School . .	53	3	35	21
Craigflower . .	15	8	11	12
Nanaimo . . .	22	10	5	27
Total . .	90	21	51	60

Admitted during the year

Victoria School	24
Craigflower	5
Nanaimo	24
Total	53

Removed during the year

Victoria School	22
Craigflower	5
Nanaimo	9
Total	36

Average attendance

Victoria School	42
Craigflower	16
Nanaimo	24
Total	82

Subjects—number of pupils in each

	Reading, Writing, Arithmetic	Grammar, Geography, History	Geometry	Latin
Victoria	30	15	0	0
Craigflower	10	10	2	1
Nanaimo	9	3	0	0
Total	49	28	2	1

	Book-keeping	Drawing	Scriptures
Victoria	4	20	38
Craigflower	0	0	20
Nanaimo	0	0	20
Total	4	20	78

Emoluments received by the Teachers during the past year

	Salaries	Fees from Pupils	Voluntary Contributions
Victoria	£150	£35 10 0	£9 3 0
Craigflower	150	12 12 0	0 0 0
Nanaimo	150	25 7 6	0 0 0
	£450	£73 9 6	£9 3 0

> Although it is beyond the province of this Report to enter into the wide question of an educational system, I venture to submit one or two remarks on the present state of the Colonial Schools. While it is plain that they are conferring a great benefit on a large proportion of the community, that they are doing so at a small charge on the Public Revenue, and that the absence of any one of these schools would be severely felt, it is also plain that they are at present in an imperfect and elementary state. This arises partly from the growth of the pupils and the short time during which, in many cases, they remain at school ; but chiefly from the insufficient supply of teaching power.
>
> It cannot be expected that while from 25 to 50 scholars are under the care of a single teacher without assistants or monitors, the schools should be in so efficient a state as might be desired.
>
> It is therefore gratifying under these circumstances to be able to report that they are working in a really useful manner.

In this report from the acting superintendent mention is also made of two private schools in Victoria—both under the patronage of the then Lord Bishop of British Columbia —a collegiate school for boys and a ladies' college. The collegiate school was conducted, so says the prospectus, upon the plan of the grammar schools of England and was designed to qualify for the learned professions, commercial and mercantile pursuits, and for the universities. In addition to religious instruction, the course of education comprised a thorough English education, arithmetic, penmanship, mathematics and book-keeping. Modern languages, including French, German and Spanish, were also taught, as well as ancient Hebrew, Greek and Latin. The elements of natural philosophy were also in the curriculum ; likewise drawing, including landscape, figure and line drawing, together with the principles of architecture and design. The fees were five dollars, six dollars and eight dollars per month, according to the age of the boys. A reduction was made to families sending more boys than one to school. All fees were payable in advance. There were two vacations in the year.

The course of study of the ladies' college, although less

ambitious, was probably more closely adhered to in the class-room. It comprised religious and moral training, English in all its branches, modern languages, music, singing, drawing, painting, etc. The only extras were modern languages, music, singing, drawing, and painting. The fees, graduated again according to the age of the young ladies, were five dollars, six dollars and ten dollars per month. The extras cost an additional two dollars per month each.

It was not until 1865 that the legislative assembly of Vancouver Island attempted to pass any comprehensive legislation dealing with the public schools. In that year, on May 15, there was passed an act that remained in force until repealed by the ordinance of 1869. Its main provisions were as follows :

From time to time the governor was to appoint a general board of education consisting of nine persons, three of whom constituted a quorum ; this general board was made a body corporate and all school property was vested in it ; the board was to meet once a month and report to the governor as to the state and condition of the common schools ; the governor had power to appoint a superintendent of education, at a salary of fifteen hundred dollars per annum, who was *ex officio* the secretary of the board ; the superintendent was to continue in office for one year from the date of his appointment, unless removed from office for neglect of duty, improper conduct or incompetency, but was not entitled to any additional allowances for travelling expenses or other charges ; the general board had the power, with the approval of the governor, to establish as many school districts as it deemed expedient, to prescribe the course of study and to select and prescribe such books as were deemed most suitable, and to authorize the purchase and distribution of such books ; the governor was given power to appoint such persons as he might think fit to be teachers of the schools, as well as to appoint from time to time a local board of education of not less than three persons in any school district, if he should think it expedient to do so, for the information and guidance of the general board of education. This last-named board was given power to visit and to report on the state of the schools

within its district. The general mode of transacting business by the local board and the nature of the reports to be furnished were made subject to the order and direction of the general board of education. The duties of the teachers were also prescribed by this general board. The superintendent's duties were to visit the schools and to report on them by the order and according to the instructions of the general board. All schools established under the act were to be conducted upon non-sectarian principles; books inculcating the highest morality were to be selected, and all books of a religious character teaching denominational dogmas were to be excluded; the clergy of every denomination, at stated intervals to be fixed by the general board of education, were allowed to visit the schools and impart in a separate room religious instruction to the children of the respective persuasions. Finally, every school was to be open to the children of persons of all denominations, and the power of expulsion in cases of gross misconduct was to be at the discretion of the local board of education, or, in the absence of a local board, at the discretion of the teacher.

Such were the main provisions of the first school act passed for Vancouver Island, an act which virtually centred all authority in the governor. The governor appointed the general board of education, the superintendent, the local board, even the teachers of the several schools. On the other hand, it must be remembered that all schools established under the act of 1865 were entirely free and non-sectarian. Even the cost of providing for the incidental expenses of the schools was met by the general board of education. The grant made by the legislative assembly for maintaining district schools during 1865 was $10,000. For each of the two preceding years the legislative grant was $5000.

An honest attempt now appears to have been made to put the act into operation. The general board of education was appointed, and Alfred Waddington [1] became superintendent.

[1] In early life Waddington had been interested in mining on the European continent. After emigrating to California from England, he came to Victoria in 1858 and engaged in various pursuits until 1862, when he conceived the idea of constructing a wagon road from Bute Inlet to Fort Alexandria on the Fraser River, a wagon road that was to form the first link in an overland railway. In

The first meeting of the board was held early in June 1865, and one of its first acts was to ask the secretary of the colony for a detailed statement of the school property on Vancouver Island to be conveyed to, and vested in, the board. Information on this point appears to have been supplied later by the superintendent, who gives the following list :

1. The ten-acre school reserve, Victoria District, with the buildings and fences.
2. Five acres at Craigflower, donated by the Puget Sound Company, with the buildings and fences.
3. Four acres at South Saanich with buildings and fences.
4. A quarter of an acre near the Royal Oak, Lake District, with buildings and fences.
5. The Vancouver Coal Company made a written offer of a very eligible site at Nanaimo on condition that a school should be erected in two years.
6. A church and school reserve near Elk Lake, and others perhaps elsewhere.

The board of education also entered into a contract with Hibben and Carswell for a supply of school books. The first order was for a supply of 3174 books, including readers, spellers, copy-books, histories, geographies, etc. One half of these books was to be brought via Panama, and the other half via Cape Horn. When the boxes arrived they were held at the book-store in Victoria subject to the order of the board. The books were sold to the pupils by the teachers, who afterward forwarded the proceeds to the superintendent.

In October 1865 the board prepared an interesting statement of the probable expenditure for education on Vancouver Island for the year ending December 31, 1866. From it we learn that the following schools were expected to be in operation during 1866 : two divisions in the Boys' Central School, Victoria ; two in the Girls' Central ; and schools of one division in each of the following districts : Victoria

the prosecution of this plan he spent nearly his entire fortune struggling against difficulties, until the Chilcotin Indians massacred his camp of road-makers, seventeen in number, and destroyed his stock of tools and provisions. He died in February 1872 at Ottawa, whither he had gone to press upon the attention of the Canadian government his great scheme for the construction of an overland railway through British territory.

District, Craigflower, Esquimalt, Cedar Hill, Lake, South Saanich, Cowichan, Nanaimo, and Salt Spring Island. To pay salaries of teachers in these several districts, provide for incidental expenses, erect new buildings where needed and repair old ones, the board estimated that the sum of $25,500 would be necessary.

But the financial affairs of Vancouver Island were fast approaching a crisis. Perhaps never in the history of the island had the outlook been so ominous as in the early months of 1866. In August of that year the secretary of the colony wrote to the superintendent as follows :

> I am desired by the Governor now to notify you, for your own information, and also for the information of the Board of Education, and the different school teachers, that there does not appear any probability of the ways and means being at the disposal of the Governor to meet the expenditure on account of education, and that His Excellency is therefore compelled at once to state that he will not guarantee the payment of any further expenditure under that head whether on account of salaries, rent or other matters beyond the 31st of August, instant.

A copy of this letter was forwarded by the board to each of the teachers, who, with commendable zeal and with only one exception, expressed their willingness to continue their duties and wait for the return of brighter days.

It will now be necessary to give some account of the progress of education in the sister colony of British Columbia, or the Mainland, as it was familiarly called. In 1862 the Rev. Robert Jamieson, a minister of the Presbyterian Church, opened the first school at New Westminster, which, though intended for the public, was supported by tuition fees. In a letter to the *British Columbian*, July 2, 1864, William Clarkson thus sets forth the facts :

> He [Jamieson] offered to conduct a school on strictly non-sectarian principles and thus make it acceptable to all and the forerunner of a regularly organized system on the same basis. This continued for nine months until Mr Jamieson in March 1863 called a meeting of

> the parents of the sixteen children then attending the school and handed over the whole affair to us, recommending Mr McIlveen as a well-qualified teacher and advising an application to the Governor for aid. We then made regulations for conducting the school and defined the duties of a committee for its management and sent a memorial to Governor Douglas stating what we proposed to do, and applying for £100 for one year, engaging to raise another £100 amongst ourselves by school fees. This money we got from the Governor.

It is not known what fees were charged by Jamieson, but under McIlveen the fee was two and one-half dollars per month for each pupil. As John Robson wrote, such a tax fell very heavily upon families having a number of children attending school and placed education entirely beyond the reach of some. He trusted that the government would see the necessity of carrying out the views of the public as expressed at a recent meeting and so place the school upon a broader, more liberal and healthy basis. In October 1864 Governor Seymour notified the trustees that he would sanction the payment of four shillings per month to the master for each child regularly attending the school whose parents paid six shillings a month. In the same letter the governor stated that he would write to England for a supply of the best modern school-books. Commenting on this the *British Columbian*, in October 1864, declared that the feeling of dissatisfaction on account of the absence of proper text-books for the common schools was by no means confined to His Excellency, and that the reason why other books than those then in use had not been prepared was easily explained. The public had for three years past been anxiously waiting for some sort of a school system ; and as such a system would doubtless make provision for the books to be used, it had not been deemed prudent to incur the expense of importing a supply, the use of which might not be authorized by subsequent legislation.

The reference above to ' common schools ' is misleading. There was no school in the colony except that at New Westminster. In November 1864 Yale and Douglas were offered

schools on the same terms as those enjoyed by the New Westminster school, but they did not accept the offer. The country was then just beginning to experience the hard times which usually follow a 'boom,' and it is probable that neither place could raise the necessary funds.

The great difficulty in these early days appears to have been to keep the school non-sectarian. The files of the *British Columbian* for 1864 and 1865 are filled with correspondence and editorials on the subject. John Robson championed most vigorously the cause of the non-sectarian school, and it is no exaggeration to say that British Columbia owes its non-sectarian schools largely to his influence.

In January 1865 resolutions were passed at a public meeting in New Westminster advocating that education should be established on a religious, but non-sectarian, basis. Replying to this resolution on March 16, 1865, Governor Seymour stated that the gentlemen who attended the meeting might be sure that any regulations drawn up by the government should have for their basis the general principles advocated by these gentlemen, together with the utmost deference for the religious convictions of every denomination of Christians.

The Supply Bill for 1864 shows a grant for education for the Mainland of £500; that for 1865, £1000; and that for 1866, the year of the introduction of decimal currency and the year of the union of British Columbia and Vancouver Island, the sum of $5000.

II

EDUCATION IN BRITISH COLUMBIA BEFORE CONFEDERATION

BY an act passed by the imperial government on August 6, 1866, Vancouver Island and British Columbia became one colony under the name of British Columbia. The fourth section of the act provided that the form of government existing in British Columbia should extend over Van-

couver Island. It was further provided that notwithstanding the union, the laws in force in the separate colonies of British Columbia and Vancouver Island at the time of the union taking effect should, until otherwise provided by lawful authority, remain in force as if the act of union had not been passed or proclaimed.

At the time of the union, therefore, Vancouver Island was endeavouring, although with insufficient funds, to carry out the provisions of the Free School Act of 1865, while the Mainland, without any school legislation whatever, was struggling to support a school at New Westminster under an arrangement whereby the governor sanctioned the payment out of the public funds of four shillings a month to the schoolmaster for each child regularly attending the school whose parents paid six shillings a month.

The first session of the legislature of the united colony, the same being the fourth session of the legislative council of British Columbia, met at New Westminster on January 24, 1867. In Governor Seymour's speech he promised to address the legislative council during the session on the subject of education, a promise which he implemented on February 24 by submitting the following extraordinary message:

> In fulfilment of a pledge given by the Governor, in the Address with which he had the honour to open the present Legislative Session, he now lays before the Council his views on the subject of education at the public expense.
>
> He has to refer to two different sections of the colony in which the question has been treated in different ways. In Vancouver Island the attempt has been made to make the education of the youth in the colony a burden on the community. The Governor lays before the Council statements of the present condition of the relations existing between the Government and the Public Schools of the Island, and leaves the question as to the indebtedness on the one side, or unreasonable expectations on the other to be freely dealt with by the Council —one from which the Governor stands aloof. He will merely state that in the opinion of his predecessor the system was not successful, and that other objects besides the intellectual advancement of the children of

the colony were sometimes allowed entrance into the consideration of the Board of Education.

On the Mainland the Governor has been compelled to acknowledge that the population is yet too small and scattered for any regular system of education to be established. Where parents have been willing to pay towards the instruction of their children, he has, with the consent of the Legislative Council, assisted them from the public funds. The schools have not been under the direction of the Government, and pupils have been led or sent from those that asked assistance from the public to those enjoying the dignity of independence, or back again as the parents might elect.

The Governor is of opinion that the colony is not yet old enough for any regular system of education to be established; nor would he wish, under the present constitution, to press his own views upon the Legislature, though he has no desire to conceal them. He thinks that any man who respects himself would not desire to have his children instructed without some pecuniary sacrifice on his own part. The State may aid the parent, but ought not to relieve him of his own natural responsibility, else it may happen that the promising mechanic may be marred, and the country overburdened with half-educated professional politicians or needy hangers-on of the Government.

As the Governor is aware that there is no subject upon which more words have been wasted than that of gratuitous instruction and the duty of the governing authority towards the people in the matter, he will at once proceed to consider the relations in which the Government may properly stand towards the parents. In his opinion, all that the State can do is to enable children to overcome the almost mechanical difficulties which seem to bar their passage over the threshold of knowledge, and having effected this to leave to parental affection and knowledge of individual character the choice of the arms with which the child shall at a future period fight the battle of life. It is vain for the State to attempt to drive on in an even line the idle and the industrious —the boy of ready aptitudes and him whose brain becomes pained and confused in endeavouring to master the simplest problem. The Governor conceives it to be the duty of the governing power to assist in the giving

to all elementary instruction, and then to offer inducements to those who are able to come to the front in the intellectual struggle with their fellow men.

But he will not, while addressing the Council, conceal any portion of his thoughts. He believes that the community in which he resides is one where complete toleration in religious opinion exists. It is not therefore, under these circumstances, for the state and its salaried officers to interfere with the belief of any one. The Government has not undertaken to prove to the Jew that the Messiah has indeed arrived ; to rob the Roman Catholic of his belief in the merciful intercession of the Blessed Virgin ; to give special support to the Church of England ; to mitigate the acidity of the Calvinistic doctrines of some Protestant believers, or to determine, authoritatively, the number of the Sacraments. Therefore, the Governor is of opinion that when the time comes for the establishment of a large common school, religious teaching ought not to be allowed to intrude. It is vain to say that there are certain elementary matters in which all Christians, leaving out the Jews, must agree. It is merely calling upon a man, picked up at random, allured by a trifling salary, to do what the whole religious wisdom, feeling and affection of the world has not yet done. The paring down of all excrescences which a man on a hundred and fifty pounds a year may think disfigure the several religions, and the reducing them to a common standard, becomes a sort of Methodism which may locally be named after the schoolmaster who performs it.

In a colony with which the Governor was recently connected he left the following school system. There was a public school open to all denominations, where the schoolmaster did not presume to open to the children any sacred mysteries. The charge upon the children attending regularly was half a dollar a month. But there were Denominational Schools, also, to which the Government contributed, but in a moderate degree. It was found that these Denominational Schools, though more expensive to the parents, absorbed the greater number of the children. Such is the system he would desire to see in any concentrated community.

In the meantime Superintendent Waddington, under

instructions from the board of education, was endeavouring to carry out on the Island the provisions of the Free School Act of 1865. But the financial position of the board was already desperate. The last of the one hundred and fifty-six letters written by the superintendent during his two years and three months' tenure of office is dated at Victoria, September 6, 1867. The free schools established by the board on Vancouver Island ceased to exist.

It is interesting to note before leaving the subject that the superintendent of education submitted, in July 1867, the following list of the number of children attending the common schools of Vancouver Island :

Central School, Victoria, Boys	63
,, ,, ,, Girls	45
Victoria District School, Mixed	93
Esquimalt ,, ,, ,,	25
Craigflower ,, ,, ,,	36
Lake ,, ,, ,,	23
South Saanich ,, ,, ,,	14
Nanaimo ,, ,, ,,	60
	359
Cedar Hill (closed)	11
Cowichan ,,	7
	377
Salt Spring Island (no school)	22
	399

He further notes that there were 404 children enrolled in January 1866, but adds that since August 1866 rather more than one hundred children had left the colony. During the two sessions of the legislative council that met at New Westminster in 1867 and 1868 nothing was done to promote the educational interests of the united Colony of British Columbia beyond voting the sums of $10,000 and $6000, respectively, for school purposes. During these two sessions the council, although successful in passing several important measures, was torn by dissensions regarding the question of the

final location of the capital. Finally, on April 2, 1868, the following resolution was passed by a vote of fourteen to five:

> That this Council, having been requested by His Excellency the Governor to assist him with their advice in coming to a decision as to the selection of a seat of government for the united Colony of British Columbia, is of opinion, after careful consideration of His Excellency's message and its enclosures on the subject, that Victoria is the place most suitable for the seat of government of the united Colony.

On April 28 of the same year Governor Seymour forwarded a message, in which, after acknowledging receipt of the above resolution, and admitting that Her Majesty's government appeared to lean to the same opinion, he stated that he would 'cause to be proclaimed on the Queen's birthday, the selection of the Capital within the town which bears Her Royal name.'

The next session of the legislative council met at Victoria on December 17, 1868. On March 13, 1869, Governor Seymour gave his assent to 'An Ordinance to establish Public Schools throughout the Colony of British Columbia,' the main provisions of which were:

The Common School Act, 1865, of the former colony of Vancouver Island was repealed. The governor in council was given power to describe school districts, to define their boundaries, and from time to time repeal, alter, or amend the same; to hear and determine all applications for grants of public money for the assistance of common schools, and to apportion the sums of money granted by the legislature for that purpose, provided that the assistance granted to any teacher should not exceed five hundred dollars per annum; to appoint teachers to the common schools, and, upon good cause being shown, to remove the same or appoint others in their stead; to provide for the examination of teachers; to provide that the text-books used in the schools should be of a proper and non-sectarian character; and to provide for the visitation and the inspection of schools, provided that the expense of such inspection should not be borne by the school funds. Other provisions gave power to the

governor in council to refuse to create school districts in cases where the number of children likely to attend did not exceed twelve or where the amount likely to be collected would not exceed three hundred dollars per annum for the school teacher. Provision was made for the annual election of three trustees who were to constitute a local board, with the exception that in Victoria and New Westminster the municipal councils were constituted local boards for their respective cities. Local boards were given somewhat extensive powers, among others that of calling a special meeting of the freeholders and resident householders of the district for the purpose of deciding how the balance of the money over and above the government grant of five hundred dollars should be raised, whether by voluntary subscription, tuition fees or general rate, provided that the tuition fee should not be fixed at more than two dollars per month for each scholar. It was also made lawful for any clergyman of any denomination, before and after the regular school hours, to visit the public school of the district in which he lived and to impart such religious instruction as he might think proper to the children of his own denomination.

The ordinance of 1869, while it provided slightly more for the decentralization of authority than did the Common School Act of 1865, was yet inferior to the latter in several important details. Under the act of 1865 all schools were free and non-sectarian; under the ordinance, while the schools were non-sectarian, they were not free. But the most serious defect of the ordinance consisted in the omission to provide for any executive officer. No mention was made either of superintendent or government inspector.

While the legislature was still in session a report was made by the chairman of the board of education (under the act of 1865) from which it appeared that there was still owing to the teachers for past services the sum of about four thousand dollars. John Robson moved in the house that a humble address should be presented to His Excellency the governor recommending that certain arrears due to school teachers should be paid out of the sum voted in the estimates for school purposes. This resolution was lost by a vote of

seven to eight. And so for another year the teachers went hungry.

During the following session, however, a select committee of the house was appointed to inquire into the petition of the school teachers for arrears of salaries. This committee recommended that the prayer of the teachers should be granted, inasmuch as the claims had been incurred under the sanction of the late board of education and had been reported by the chairman of that board to be due and unpaid. The report of the select committee was adopted by the legislative council with the exception of the recommendation of the claims of the late Superintendent Waddington.

Some idea of the manner in which the provisions of the school ordinance of 1869 were being carried out by the government may be obtained from the answers given by the secretary of the colony in 1870 to a series of questions submitted in the house, as follows :

> Q. What (if any) provision has been made for the examination of Public School Teachers, as well regarding efficiency as character ?
>
> A. No special provision has yet been found possible for the examination of Public School Teachers as to efficiency or character.
>
> Q. What (if any) provision has been made for the visitation and inspection of Common Schools ?
>
> A. No provision has yet been made for the visitation and inspection of Common Schools, there being no provision in the Ordinance for the appointment or remuneration of an Inspector or Inspectors.
>
> Q. What (if any) regulation has been made for the due returns being made of the receipts and expenditure of Common Schools ?
>
> A. Returns of the revenue and expenditure of each year are required of each Local Board by the Government.
>
> Q. What (if any) rules and regulations have been made for the management and government of Common Schools ?
>
> A. No regulations have been made for the management of schools, other than those of the Local Boards under the Ordinance, which, however, possess full power.

Q. What (if any) provision has been made for the Annual Report of the Common Schools of British Columbia for the past year ?

A. An Annual Report is required by the Government of all Local Boards.

The following return was, however, brought down during the session of 1870 showing the number of schools in operation during the preceding year :

School District	Salary per annum		Expenditure on each School from Government Grant	Revenue and Expenditure of Local Boards	Average number of pupils during the year
	Government Grant	Local Aid			
Victoria City .	At the rate of $500	Nil	$1,540	No regular accounts have been kept by the Local Boards	70½
Victoria District .	500	Nil			49
Craigflower . .	500	Nil	430		26
Lake . . .	500	No return	374		No return
Cedar Hill . .	500	$60	125		25
Saanich . .	500	150	250		18
Nanaimo . .	500	Nil	422		31
New Westminster	500	No return	715		23
Sapperton . .	400	Fees	380		16
Langley . .	500	No return	536		13
Yale . . .	500	Nil	427		No return
Lytton . . .	500	$120	Nil		24

The government soon found it necessary to amend the school ordinance of 1869. Accordingly, during the session of 1870, an amendment was introduced providing for the appointment of an inspector of schools, whose salary was to be paid out of the general revenue of the colony and whose duties were to visit and inspect the common schools and to report for the information of the governor in council regarding the management, efficiency, and general conditions of the

schools; the character and qualifications of the teachers; all complaints which might be made regarding the condition or management of any school; and, lastly, the text-books in use in the school. A further amendment granted power to the governor in council to appoint not less than three and not more than five fit and proper persons to be a board of examiners for the purpose of examining school teachers and granting them certificates of qualification.

But no amount of tinkering with the school ordinance of 1869 could give it life. In the city of Victoria the tax called for under the act to supplement the teachers' salaries was paid for one year, but was voted down the next, with the result that the effort to keep open the schools was abandoned in September 1870. From that time until 1872 there was no public school in the city. The government soon learned that only an absolutely free school system would meet the requirements of the colony.

III

EDUCATION SINCE CONFEDERATION

BRITISH Columbia joined the confederation of the eastern provinces in 1870. During the session of 1871 a bill was introduced into the legislative council which altered the constitution of the province and practically introduced the principle of responsible government. On April 11, 1872, was passed 'An Act respecting Public Schools,' which with some important amendments remains the school act of the present day.

Under the act of 1872 the Common School Ordinance of 1869 and the Common School Amendment Ordinance of 1870 were respectively repealed; the sum of forty thousand dollars for 1872, and for each subsequent year such sum as might be voted by the legislative assembly, was set aside out of the general revenue of the province and designated the Public School Fund; and a board of education to consist of six fit and proper persons was appointed by the lieutenant-

governor in council. The lieutenant-governor in council had also power to appoint a superintendent of education, who was *ex officio* chairman of the board of education and who was to hold office during the pleasure of the lieutenant-governor and receive an annual salary of two thousand dollars and such additional allowance for travelling expenses as the lieutenant-governor in council might grant. A person was not eligible for the position of superintendent unless he had been an experienced and successful teacher of at least five years' standing and held a first-class certificate from some college, school, or board of examination in some other province or country where a public school system had been in operation. The lieutenant-governor in council was given power to create school districts in addition to those already in existence, provided that no school district should be created in which there were less than fifteen children of school age—between five and fifteen years; to grant, on the application of the school trustees of any district, such sums of money as might be required to pay the salary of the teacher, and to defray the cost of erecting the schoolhouse, the cost of all furniture and apparatus necessary for the use of the school, and also the incidental expenses connected with the school; and to grant such sum as might be deemed proper to aid in the establishment of a school in any section of the province not a school district in which there were not less than seven and not more than fourteen children of school age.

It was the duty of the board of education to meet at least once in every three months; to adopt all lawful means in its power to advance the interests of the public schools; to prescribe a uniform series of text-books and to authorize the purchase and distribution of these books among the different public schools; to make rules and regulations for the conduct of the schools; and to examine and give certificates of qualification to the teachers. These certificates were to be of three classes: a first-class certificate, valid until revoked by the board of education; a second-class certificate, valid for three years; and a third-class certificate, valid for one year. The board of education was also given power to appoint the teachers in the several school districts, to fix

their salaries, and upon good cause shown to remove them; to take charge of all apparatus to be used in the schools and to distribute this among the schools on the application of the trustees; to establish separate schools for females where such board might deem it expedient so to do; and to establish high schools in which classics, mathematics, and the higher branches would be taught.

The duties of the superintendent of education were: to visit each school at least once in every year; to examine at the time of his visit the state and condition of the school, as regards the progress of the pupils in learning, the order and discipline, the system of instruction pursued, and the character and condition of the school buildings; to persuade and animate parents and teachers to improve the character and efficiency of the public schools; to see that the schools were conducted according to the law and that no unauthorized books were used; to make annually a report of the actual state of the schools of the province; to prepare suitable forms for making all reports; and to investigate all complaints regarding the method of conducting the election of school trustees.

Provision was also made by the act of 1872 for the election of three school trustees in each of the several districts, and the powers, responsibilities, and duties of these trustees were defined at length. All public schools were to be conducted on strictly non-sectarian principles. The highest morality was to be inculcated, but no religious dogmas or creeds were to be taught.

The first board of education appointed under this act consisted of W. F. Tolmie, M. W. T. Drake, A. Munro, A. J. Langley, R. Williams, and E. Marvin. John Jessop was appointed superintendent of education. Jessop was one of the early pioneers of the province. He was born in England in 1829 and left his native country at the age of seventeen and proceeded to Toronto, where at the Normal School he secured his teacher's certificate in 1855. After serving for some years as a teacher in Ontario Jessop left for British Columbia, taking the Hudson's Bay Company's route through Fort William to Winnipeg. With a party of seven others he walked from Winnipeg to the Rocky Mountains, which he

crossed at Boundary Pass. Late in the year 1859 he reached Victoria. The next year he visited Cariboo and engaged in gold-mining there, but was unsuccessful. He returned to Victoria in 1862 and opened a private school. At the time of his appointment on April 18, 1872, he was principal of the Boys' Central School.

School affairs were now placed on a sound basis for the first time in the history of the province. There was the permanent board of education, consisting of six members acting under authority of the Public School Act, and their superintendent of education, or executive officer. There was also the fund of forty thousand dollars upon which the board of education could draw for the payment of the salaries of the teachers, the erection and repair of the schoolhouses, and the payment of the incidental expenses of the several school districts. From 1872 to the present time (1913) we have an uninterrupted series of annual reports submitted by the superintendents to the legislatures in which will be found compiled the school statistics of the respective years to which they refer.

In the superintendent's first report, for the year ending July 31, 1872, we read that, although only three months had elapsed since the appointment of the board of education, yet seventeen regular meetings for the transaction of business had been held. Rules and regulations for the government of public schools and rules for the examination of public school teachers had been adopted; sixteen certificates of qualification had been issued to school teachers after examination; seven candidates had failed, seven certificates had been granted on diplomas and certificates submitted to, and approved by, the board; but third-class certificates only had been issued.

Schools in the following districts had been in operation during at least part of the year ending July 31,1872: Victoria City and District, Esquimalt, Craigflower, Metchosin, Sooke, Cedar Hill, Lake, Saanich, South Cowichan, North Cowichan, Salt Spring Island, Nanaimo, Comox, New Westminster, Langley, Yale, Chilliwack, Granville, Sumas, Clinton, and Hope.

The superintendent reported the number of pupils attending the public schools from which returns had been received at 399; from districts that had not sent in returns at 115; leaving 1244 not attending the public schools. There were about 350 children attending the several private and denominational schools. More than 900 children did not attend any school, of whom some 200 lived in the upper country out of reach of schools of any kind.

Of the sixteen teachers engaged in the schools of the province twelve were English, two Canadian and two American. Eight held certificates from the board of education and eight were teaching under temporary arrangements. The highest salary was one hundred dollars, and the lowest forty dollars, a month.

There were in the province twelve schoolhouses that might be regarded as public property, nine of which were wooden or frame buildings and three log buildings. Only six schools were properly furnished with maps, four were partially furnished, while six were without maps of any kind. In all the schools there was a great lack of blackboards.

The superintendent then proceeded to introduce to the favourable consideration of the government a scheme of his own to meet the educational needs of the province east of the Cascades. He recommended the erection of a large central building near Cache Creek capable of accommodating one hundred pupils, both male and female. The schoolhouse was to consist of a large schoolroom thirty by thirty feet, kitchen, teachers' rooms, bedrooms, and two large dormitories, one thirty by thirty feet and the other eighteen by thirty feet. The boys and girls were to have no communication with each other, either during meal or study hours. The teaching staff was to consist of two married men with their wives, all to be competent teachers. The salaries were to be fifteen hundred dollars, with board and lodging, for each couple. One of the teachers selected was to be a man with some knowledge of medicine, who, with an experienced nurse for matron, would be quite competent to treat most of the ailments incident to childhood.

It may be of interest to recite the further history of this

school. The building was erected in 1873 at the junction of Cache Creek with the Bonaparte River, and was formally opened on June 2, 1874. Eighteen pupils of both sexes were then enrolled, a number which rapidly increased to thirty-six. In fact, the superintendent reported that the success of the boarding-school experiment was already beyond doubt. It was the settled conviction of almost every person in the upper country that there was no other feasible method of bringing educational facilities within reach of the widely scattered families in the interior. He went on to say that the success of the school was so assured that he felt no hesitation in recommending that a sum of money should be placed in the estimates of the next year for the erection of another building near Soda Creek.

The schoolhouse at Cache Creek was soon too small for the numbers desirous of entering it, and it was decided to enlarge it so as to double its capacity. This was effected by extending the front of the original building in a southerly direction towards Cache Creek sufficiently far to form a new and larger schoolroom with a dormitory for boys on the second floor. The old schoolroom was converted into a dining-room. The superintendent hoped that this arrangement would also result in the sexes being kept more apart than they had hitherto been. But alas for the vanity of human wishes! In a letter to the provincial secretary, written on July 7, 1876, the superintendent reported that the ex-principal of the school could not be prevailed upon to hand in his accounts; that instead of obtaining a full and businesslike financial statement, he could only gather from the neglected and incomplete books that the liabilities of the school amounted to more than $2200, while the assets made up a total of only $1300. He added that the building, which was so well provided with every requisite two years before, was now almost destitute of kitchen and dining-room furniture, and that the great amount of breakage of crockery, lamps, lamp chimneys, table forks, etc., must have been the result of carelessness on the part of the authorities in charge. The entire building had a dilapidated and neglected appearance. The attendance, which in June 1875 was forty-four, had fallen to fifteen

in May 1876, and the moral reputation of the establishment had suffered grievously. As usual, a convenient scapegoat had to be found. The superintendent declared that the reputation of the institution had been nearly ruined and its financial condition brought to the verge of bankruptcy by the inability of the secretary-treasurer to attend properly to the duties of his office. It would have been more reasonable to attribute its failure to the inexperience in business matters of the principal of the school and to the dangerous experiment of housing under one roof forty-four boys and girls, some of them of mature age.

During the session of 1876 a select committee of the house, appointed to inquire into the condition of the Cache Creek boarding-school, reported that it was advisable that boys and girls should not be educated in the same establishment; that the children should not be required to perform menial duties; that no balls or political meetings should be held in the school building; that the teacher should superintend the conduct of the scholars out of school hours; that the boys should be presided over by a master and a matron who were husband and wife; and that the girls' school should be presided over by a mistress, and if necessary by a matron in addition. But the usefulness of the institution was gone. The *Colonist* of April 20, 1877, contains an item to the effect that the boarding-house principle of the Cache Creek school should be discontinued and the school converted into an ordinary day school if the number of children in attendance was sufficient to comply with the law, a suggestion which was carried into effect a few years later. Thus ended the career of an institution which with proper supervision might have solved the problem of educating the children in the sparsely settled districts of the upper country.

In the meantime the other school districts of the province were making substantial progress. On February 21, 1873, the government passed certain amendments to the act of 1872, giving to school trustees the power under certain restrictions of forcing parents and guardians of children from seven to fourteen years of age to send their children to school. The trustees were also given authority to appoint from among

those persons properly qualified the teachers of their respective schools, and with the consent of a majority of the board of education to dismiss these teachers.

In his report for 1874-75 Superintendent Jessop observed that, through the liberality of the government, a large public school building in Victoria was fast approaching completion. This building was situated on the west end of the valuable school reserve of ten acres lying at the head of Yates Street and View Street and was within easy reach of almost every family within the city limits. The reproach which the capital of the province had endured for years with respect to the scantiness and inconvenience of the public school accommodation would be entirely removed ; for when the above-mentioned building was completed in all its details it would be far superior to anything of the kind on the Pacific coast. It was true that some of the schoolhouses in San Francisco were more pretentious in appearance, but none of them had such extensive and beautiful grounds or such magnificent views of city, country, and surrounding waters.

The first competitive examinations for entrance to a high school were held in twenty-one of the public schools during the spring and early summer of 1876. Of the total number of one hundred and sixty candidates only sixty-eight passed, and of this number more than three-fourths were from the Victoria schools. Of the ninety candidates belonging to schools outside Victoria only fourteen were successful. From the schools of the province outside Victoria, Cedar Hill, and North Cowichan, only five pupils succeeded in gaining admission. The first set of high school entrance papers contained questions on arithmetic, English grammar, spelling, and geography.

During the session of 1876 an act was passed to amend and consolidate the public school acts already passed by the legislature, the chief innovation being that authority was given to the lieutenant-governor in council to appoint a deputy superintendent of education. It was also enacted that no clergyman of any denomination should be eligible for the position of superintendent, deputy-superintendent, teacher or trustee.

On April 27, 1876, the Elliott government introduced the famous School Tax Bill, being an act to provide for the maintenance of public schools in the province. Premier Elliott, who introduced it, stated that the government had been asked to give the bill another name owing to the hostility aroused by it among the Roman Catholic section of the community, but that he felt he could not be guilty of such a subterfuge. The most important section of the act provided that every male person above eighteen years of age resident in the province should pay an annual tax of three dollars for the support of the public schools.

The Roman Catholic residents protested against the bill most vigorously. They declared that the so-called unsectarian school system was a flagrant violation of conscience, but that the Catholic portion of the community had reluctantly submitted to a general system of taxation, a portion of which was set apart for the support of the so-called unsectarian schools. But now that it was intended to levy a special school tax they viewed with distrust and alarm a measure which they deprecated as both unjust and oppressive. A system of education, they averred, could never be unsectarian. If it excluded the profession of Christianity, it was anti-Christian ; if it did not comprise the belief in God, it was godless and atheistic ; if it included the reading of the Protestant version of the Bible, it was Protestant. They prayed, therefore, that the Catholic portion of the community should not be included in the School Tax Act.

In spite of all opposition the bill passed into law by a vote of seventeen to six. In after years the title of the act was changed. It is now known under the name of the Revenue Tax Act and its original connection with the school system of the province is well-nigh forgotten.

Superintendent Jessop had administered the School Act with indefatigable industry. But his enemies were numerous and unscrupulous. Moreover, the Elliott government had been defeated, and the Walkem administration, which succeeded, reduced his salary from $2000 to $750 per annum. He promptly resigned on August 26, 1878, and his resignation was shortly afterward followed by that of the full board of

education. He was succeeded by Colin C. McKenzie, a graduate of Cambridge University and at the time of his appointment the principal of the Boys' Central School of Victoria. He held the position of superintendent until April 1, 1884, and after his retirement was elected, in 1890, to represent Nanaimo in the provincial legislature.

Under Superintendent Jessop the total expenditure on the schools had increased from $25,435 in 1872 to $43,334 in 1878; the enrolment of pupils from 1028 to 2198; the average daily attendance from 575 to 1395; and the percentage of regular attendance from 55 to 63. In 1872 the expenditure on the public schools was 5·9 per cent of the total expenditure of the province, while in 1878 the school expenses had risen to 9·7 per cent of the total provincial expenditure. The highest salary paid any teacher in 1878 was $125 per month, the lowest $20 per month, there having been two teachers employed during the year at the latter figure. The average monthly salary of all teachers employed was $59.14.

At its session in February 1879 the government revoked all previous education acts and in lieu thereof passed the Public School Act, 1879, by which certain provisions of the old act were abolished, others modified, and certain new provisions added. Under the new act of 1879 the board of education ceased to exist, the duties formerly belonging to that board being now transferred to the superintendent of education. This official was given power to prescribe text-books, to make rules and regulations, to establish separate schools for females, and to close schools having an average attendance of less than ten. Trustees were granted power to dismiss teachers by giving them thirty days' notice of dismissal, instead of, as formerly, by obtaining the consent of the board of education. High schools were now placed under control of the local board of trustees, instead of, as formerly, under the board of education. The act of 1879 contained also certain new provisions such as: for the appointment by the lieutenant-governor in council of paid examiners to examine teachers and grant certificates of qualification to teach; for the temporary appointment of a paid inspector to visit schools and report on them: for the

granting by the superintendent of temporary certificates; for the teacher's furnishing monthly information to the superintendent respecting his school; for the teacher's furnishing monthly information to parents respecting each of their children attending school; and for the teacher's giving thirty days' notice to the trustees of his intention to resign.

Rules and regulations for the government of the schools were revised and modernized; a series of regulations issued for the examination of public school teachers; and the subjects of examination for each class and grade of certificate set forth. In fact the Public School Act, 1879, with the Rules and Regulations issued shortly afterwards, remains, with some important amendments, the School Act of the present day.

McKenzie resigned his position as superintendent of education during the early months of 1884, and he was succeeded on April 1 of that year by S. D. Pope. Pope had formerly been principal of the Victoria High School, but for several years immediately before his appointment as superintendent had been teaching with much success one of the rural schools in Saanich. He was a graduate of Queen's College, Kingston, and obtained his B.A. degree in 1861 with honours in classics and mathematics. Before coming to British Columbia he had taught in the schools of Oregon. Pope held the office of superintendent until April 1, 1899, when he resigned, being succeeded by the present incumbent on the 10th of the same month.

Prior to 1888 the entire cost of maintaining the public schools, including teachers' salaries, incidental expenses, the erection of new schoolhouses and repair of old buildings, was met directly from the provincial treasury. Since 1888 it has been the settled policy of the successive governments to throw on the several municipalities and school districts an ever-increasing proportion of the cost of education. Thus in 1888 the municipal councils of the four coast cities —Victoria, Vancouver, Nanaimo, and New Westminster— were required to pay one-third of the salaries of all the teachers employed in their schools, a proportion which in

1891 was increased to one-half. The cost of erecting new schools, paying the incidental expenses, repairing old buildings, etc., was in 1891 for the first time thrown upon the four coast municipalities. In 1893 the trustees of these four cities secured the right of fixing the salaries of teachers in their employment, a privilege formerly exercised exclusively by the executive. The government assisted these city schools by a *per capita* grant of ten dollars, based on the average actual daily attendance of public school pupils. In 1901 all the city school districts in the province were required to provide for their respective schools, the assistance from the government being limited to *per capita* grants of thirteen dollars, fifteen dollars, and twenty dollars, graduated according to the school population of the various cities. In the act of 1905, amended in 1906, a further extension of the principle is to be noted. Rural municipalities and rural school districts were now required to pay a part of the cost of education within their respective limits. By that act the basis of the *per capita* grant was changed, and the government grant was regulated according to the number of teachers employed. At the present time (1913), therefore, the provincial aid consists merely in the payment of part of the cost of the teachers' salaries, but in no case is this government grant more than $580 for any individual teacher. The salaries of teachers employed in the 'assisted' schools and in those of the Esquimalt and Nanaimo Railway Belt (about 225 teachers in all) are still paid in full by the provincial treasury. The government, besides, still pays the cost of erecting the first schoolhouse in those rural school districts as yet unprovided with a building.

The question of providing for secondary education early occupied the attention of the government. The first high school established in the province was opened in Victoria in 1876. Eight years afterward a similar institution was established in New Westminster. During 1886 a high school was opened in Nanaimo and in 1890 another was granted to Vancouver. High schools are now in operation in Armstrong, Chilliwack, Cumberland, Duncan, Golden, Grand Forks, Kamloops, Kaslo, Kelowna, Ladysmith, Nanaimo, Nelson, New West-

minster, Peachland, Penticton, Revelstoke, Rossland, Salmon Arm, Summerland, Vancouver (North), Vernon, and Victoria. These high schools are under the control of the local boards of school trustees of the respective cities and rural municipalities. A high school cannot be established in any district in which there are less than twenty pupils who have passed the departmental high school entrance examination. The course of study corresponds largely with that of high schools in the other provinces.

In January 1901 a provincial normal school was opened in Vancouver under the principalship of William Burns. The new building was formally opened in January 1910. The staff consists of six teachers. About one hundred and sixty pupil-teachers are in attendance.

The staff of inspectors consists of twelve members, a high school inspector residing at Victoria and eleven public school inspectors stationed at various important cities throughout the province. There are, besides, municipal inspectors in charge of the schools of Vancouver, Victoria, New Westminster, and South Vancouver. The general inspectors are appointed by the provincial executive, the municipal inspectors by the school boards of the respective cities and rural municipalities.

A free text-book system was adopted in 1908. At first it included only the common and graded schools, but has since been extended to the high schools. In both instances only the chief text-books needed by pupils are supplied. From year to year, however, the list of free text-books has been increased, and it is probable that all the authorized text-books will eventually be supplied. The cost, including distribution, amounts to about sixty thousand dollars a year.

The gradual growth of the schools, as well as the cost to the government of maintaining them, is fully shown by the record of attendance and expenditure given in the following table :

Comparative Statement of Attendance and Cost of Public Schools from 1872-73 to 1910-11

Year	Number of School Districts	Aggregate Enrolment	Average actual daily Attendance	Percentage of Attendance	Expenditure for Education proper
1872-73	25	1,028	575	55·93	$36,763.77
1873-74	37	1,245	767	61·60	35,287.59
1874-75	41	1,403	863	61·51	34,822.28
1875-76	41	1,685	984	58·39	44,506.11
1876-77	42	1,998	1,260	63·06	47,129.63
1877-78	45	2,198	1,395·50	63·49	43,334.01
1878-79	45	2,301	1,315·90	57·19	22,110.70*
1879-80	47	2,462	1,293·93	52·56	47,006.10
1880-81	48	2,571	1,366·86	53·16	46,960.69
1881-82	50	2,653	1,358·68	51·21	49,268.63
1882-83	59	2,693	1,383·00	51·36	50,850.63
1883-84	67	3,420	1,808·60	52·88	66,654.15
1884-85	76	4,027	2,089·74	51·89	71,151.52
1885-86	86	4,471	2,481·48	55·50	79,527.56
1886-87	95	5,345	2,873·38	53·75	88,521.08
1887-88	104	6,372	3,093·46	48·54	99,902.04
1888-89	109	6,796	3,681·14	54·16	108,190.59
1889-90	123	8,042	4,333·90	53·89	122,984.83
1890-91	141	9,260	5,134·91	55·45	136,901.73
1891-92	154	10,773	6,227·10	57·80	160,627.80
1892-93	169	11,496	7,111·40	61·85	190,558.33
1893-94	178	12,613	7,785·50	61·72	169,050.18
1894-95	183	13,482	8,610·31	63·86	189,037.25
1895-96	193	14,469	9,254·25	64·00	204,930.32
1896-97	199	15,798	9,999·61	63·29	220,810.38
1897-98	213	17,648	11,055·65	62·64	247,756.37
1898-99	224	19,185	12,304·32	64·13	268,653.46
1899-1900	231	21,531	13,438·41	62·41	284,909.10
1900-1	245	23,615	15,098·28	63·93	312,187.17
1901-2	257	23,903	15,564·25	65·11	365,492.15
1902-3	268	24,499	16,357·43	66·76	397,003.46
1903-4	252†	25,787	17,060·93	66·16	414,383.43
1904-5	248†	27,354	18,859·41	68·94	433,005.17
1905-6	257†	28,522	19,506·23	68·39	418,227.97
1906-7	167‡	30,039	20,017·02	66·63	407,937.85
1907-8	189	33,314	23,195·27	69·62	464,473.78
1908-9	197	36,227	25,350·63	69·97	532,809.84
1909-10	211	39,822	28,094·16	70·54	612,052.74
1910-11	211	45,125	32,163·24	71·27	715,733.59
1911-12	328	50,170	37,567·88	74·88	876,415.08

* Half-year.

† Including only those in which a school was in operation during the year.

‡ The consolidation of school districts by the formation of rural municipality districts has reduced the number from 257 in 1905-6 to 167 in 1906-7.

To the above must be added the cost of erecting new buildings and repairing old ones as well as the additional amounts paid by the cities, rural municipalities, and rural school districts to supplement the government grants. Thus for the year 1911-12, for example, the cost to the government of education proper was $876,415.08, the cost of erecting new buildings $275,299.62, making the total amount expended by the provincial government $1,151,714.70. In addition to this amount the cities, rural municipalities, and rural school districts expended $2,730,773.77, making the grand total cost of education for that year $3,882,488.47.

The University of British Columbia

As early as 1877 Superintendent Jessop had pointed out the necessity of taking steps to establish a provincial university in which the youth of the country might receive a higher education that would fit them for their various vocations in life. At that date, and for many years afterward, the question was purely an academic one. It was not until 1890 that the government attempted to pass legislation dealing with the establishment of a provincial university. In that year an act was passed, entitled the British Columbia University Act, which provided that all graduates of universities who had resided in the province two months previous to the passing of the act should constitute the first convocation, and that this convocation should meet within four months thereafter. The act provided for the appointment by the lieutenant-governor in council of a chancellor and vice-chancellor. The senate was to be composed of the chancellor, vice-chancellor, seven members to be elected by convocation, and the following other members: three members to be appointed by the lieutenant-governor in council; one representative member from each of the four cities of Victoria, Vancouver, New Westminster, and Nanaimo, appointed by the representative municipal councils of these four cities; the speaker of the legislative assembly; one member elected by the teachers' institute; one member from the medical council; one representative from the law

society; the principal and professors of the university; and the superintendent of education. There were to be in the university four faculties: a faculty of arts and science, of medicine, of law, and of applied science and engineering. The university was to be strictly non-sectarian. Women were to be admitted to all the advantages and privileges accorded to other students of the university.

The first convocation was held in Victoria on August 26, 1890. The provincial secretary, John Robson, presided, and there were present seventy duly certified members of convocation: twenty-three from Victoria, twenty-four from Vancouver, sixteen from New Westminster, and seven from other points in the province. Three members of senate were elected, and convocation then proceeded to discuss certain amendments to the act which it was proposed to introduce at the next legislative session. But even at this initial meeting it was evident that it would be impossible for convocation to effect anything of importance. The unfortunate jealousy between Mainland and Island rendered futile all efforts to establish the university on a satisfactory basis.

By section 17 of the act as amended in 1891 it was enacted that a meeting of the senators of the university should be held within one month after their election by convocation. The senators had been elected on June 2, 1891, and the chancellor, Dr I. W. Powell, of Victoria, issued circulars calling a meeting of the senate for July 2. On that date there was no quorum, and a week's adjournment was proposed to enable the senators from the Mainland to attend. How a meeting that had no existence could adjourn was a puzzle to some of the senators from the Island, and it was maintained by many that a meeting of the senate not having been held within the time specified, the powers conferred by the act had lapsed. The question was referred by the chancellor to the attorney-general, who gave it as his opinion that the senate having failed to meet on July 2, no question could be decided fixing an adjournment to a future date, and that no further questions could therefore be dealt with by the senate. Such was the untimely end of the first University Act.

In 1896 an important amendment was made to the School Act whereby the boards of school trustees of the four coast cities were allowed to petition to obtain charters of incorporation as boards of governors of their respective high schools in order that they might be in a position to affiliate these high schools with eastern Canadian universities. Under this important concession, which was obtained largely through the untiring zeal of A. H. B. Macgowan of the Vancouver school board, the high schools of Vancouver and of Victoria became affiliated with McGill College, an affiliation which was extended and confirmed by an act passed in 1906 to incorporate the Royal Institution for the Advancement of Learning of British Columbia. Under this act, amended in 1907, power was granted the Royal Institution to establish, at such places in British Columbia as McGill University might designate, colleges for the higher education of men and women. The Royal Institution at once entered into negotiation with the school boards of Vancouver and Victoria, and the university classes in these two cities were transferred to the control of the Royal Institution. The instruction given to students of the colleges preparing for degrees is of a similar standard to that given in like subjects at McGill University in Montreal, while the courses of study and the examinations leading to degrees are such as are prescribed by the corporation of the same university. An immense impetus was given to the cause of higher education by this important act. In Vancouver undergraduates under capable instructors are taking up the work of the first, second, and third years in arts and the first and second years in applied science, while the classes in Victoria embrace those of the first and second years in arts. For the year ending June 30, 1912, there were enrolled at Vancouver 174 students and at Victoria 28, or 202 in all. The expenses of conducting these university classes are met by grants from the provincial government, from the respective boards of school trustees, and by voluntary contributions from public-spirited citizens.

In the meantime steps were taken by the Honourable Dr Young, the minister of Education, to establish the University of British Columbia. In 1907 an act was passed

setting apart by way of university endowment lands in the province not exceeding two millions of acres in extent, and during the session of 1908 another act was passed to establish and incorporate a university for the Province of British Columbia. The university consists of a chancellor, convocation, board of governors, senate, and the faculties of the several schools of instruction. The chancellor is elected by the members of convocation, and the first convocation consists of all graduates of any university in His Majesty's dominions resident in the province two years prior to the date fixed for the first meeting, as well as of twenty-five members selected by the lieutenant-governor in council. The board of governors consists of the chancellor, the president of the university, and nine persons appointed by the lieutenant-governor in council. The senate is composed of the minister of Education, the chancellor, the president, the deans and professors, three members to be appointed by the lieutenant-governor in council, the superintendent of education and principals of the normal schools, one member elected by the high school teachers, one member elected by the teachers' institute, and fifteen members elected by convocation from among its members. It was further provided that the university is to be non-sectarian and that instruction is to be free to all students in the arts classes.

Under authority of legislation passed in 1910 by the provincial parliament, the government in April 1910 named the special royal commission empowered to select a site for the provincial university. The personnel of the commission, whose decision as to site was final, consisted of Dr R. C. Weldon, dean of the Law School, Dalhousie University ; the Rev. Canon G. Dauth, vice-rector, Laval University, Montreal ; Dr Walter C. Murray, president, University of Saskatchewan ; Dr Oscar D. Skelton, professor of economics, Queen's University ; and Dr Cecil C. Jones, chancellor of the University of New Brunswick.

The commissioners reached Victoria in May 1910, and on the 26th of that month held their first meeting in the government buildings for organization and the preparation of an itinerary. Then followed an exhaustive examination of the

province, during which they visited Nanaimo, Vancouver, North Vancouver, New Westminster and the adjoining districts, Chilliwack, Kamloops, Vernon and the Okanagan Valley, Revelstoke, Nelson, and Prince Rupert. On June 28 the commission met in Victoria and prepared the following unanimous report :

VICTORIA, B.C., *June* 28, 1910.

To His Honour the Lieutenant-Governor in Council :

SIR,—The University Site Commission begs to submit the following report :—

In accordance with the provisions of the 'University Site Commission Act, 1910,' your Commissioners have visited and made a careful examination of the several cities and rural districts in the province suggested as suitable University sites, and have selected as the location for the University the vicinity of the City of Vancouver.

Accompanying the main report was the following supplementary report :

The University Site Commissioners are strongly of the opinion that the University should not be placed on a site which may in time be completely surrounded by a city. They respectfully suggest that not less than 250 acres be set apart for the University campus and 700 acres for experimental purposes in agriculture and forestry. This is exclusive of a forest reserve for forestry operations on a large scale.

The Commissioners are of the opinion that the most suitable site is at Point Grey, unless the soils there and those of the delta land adjacent are found to be unsuitable for the experimental work of the College of Agriculture. Should Point Grey prove impossible the Commissioners suggest : first, a site along the shore west of North Vancouver, provided the tunnel and bridge are constructed ; second, St Mary's Hill overlooking the Pitt, Fraser and Coquitlam Rivers, provided residences are erected for the students. Central Park, though conveniently situated, will probably be surrounded by the cities of Vancouver and New Westminster, and because of this and of the absence of outstanding scenic advantages is undesirable.

While the Commissioners are firmly convinced that

it is of the highest importance to have all the faculties of the University doing work of University grade located together, they believe that the diverse conditions of agriculture in this Province make it advisable to divide the work of agricultural education between the College of Agriculture at the University and Schools of Agriculture of secondary grade located in different centres. The College of Agriculture should conduct researches, provide courses leading to a degree, and supervise the extension work and Schools of Agriculture. These schools should be established in conjunction with the Demonstration Farms in typical centres, and should provide short courses (extending over the winter months) of two or three years for the sons of farmers. Each school might specialize in one or more branches, such as horticulture, dairying, etc.

Similarly, Technical Evening Schools might be opened in the different coal-mining centres for the preparation of candidates for mining certificates, and in the metal-mining districts for the assistance of prospectors and others.

The Commissioners have been greatly impressed by the marvellous richness, variety, and extent of the natural resources of this Province, and by the very generous provision made for the endowment of the University; and they are of the opinion that if the University adopts a policy of offering salaries ranging from $3800 to $5000 to its professors, it will attract men of the highest ability, who, by their scientific investigations and outstanding reputations, will not only materially aid in developing the resources of the Province, but will also place the University on an equality with the best universities in America.

In the autumn of 1910 the executive, after careful re-examination of the three proposed sites, finally decided to locate the university at Point Grey. During the session of 1911 an act was passed authorizing the lieutenant-governor in council to grant some two hundred acres of land at Point Grey as a site for the university. Contracts for clearing and grubbing the site have already been let, and it is hoped that the first building will be completed and university classes organized in the autumn of 1915.

The first meeting of convocation was held in the assembly room of the South Park School, Victoria, on August 21, 1912. The Honourable F. L. Carter-Cotton, the representative of Richmond Riding in the legislature, was elected chancellor of the university, and the following were chosen as members of the senate: Dr R. E. McKechnie, Judge Howay, N. Wolverton, J. S. Gordon, Mrs J. W. deB. Farris, F. C. Wade, W. P. Argue, Dr W. D. Brydone-Jack, J. M. Turnbull, E. W. Sawyer, Mrs M. R. Watt, C. D. Rand, Chief Justice Hunter, J. M. Pearson, and E. P. Davis.

The government had in the meantime been engaged in securing information that would enable it to choose a suitable president for the university. The minister of Education in the early part of the session of 1913 announced that the executive's choice had fallen on Dr F. F. Wesbrook, a distinguished graduate of Manitoba University who had pursued his post-graduate studies at some of the larger universities of England and Germany. Dr Wesbrook brings to the discharge of his duties a ripe scholarship, a pleasing personality, and an invaluable experience of university work in all its phases acquired while serving as dean of the medical faculty of the University of Minnesota.

NOTE.—Information for this article on Education has been obtained by consulting Bancroft's *History of British Columbia*; Begg's *History of British Columbia*; Gosnell's *Year Books*; the *Annual Reports* of the superintendents of education; the files of the *Colonist* from 1858; and especially the *Journals* of the British Columbia House of Assembly. Special thanks are due to His Honour Judge Howay, of New Westminster, who furnished the author with much information regarding the history of Education on the Mainland.

THE FISHERIES

THE FISHERIES

I

PHYSICAL CHARACTERISTICS AND THE FISHERIES

ALTHOUGH the coast-line of British Columbia is entirely comprised between the 49th and 55th parallels, its sinuosities have been reckoned at over twenty thousand miles in extent, or, taking account of but the major indentations, seven thousand miles in extent as against five thousand for the Atlantic coast-line of the Dominion. The mainland is deeply indented with hundreds of fiords of great length ; the waters of these fiords are deep, and to them nature has offered effective shelter in opposing to the winds and storms of the Pacific a barrier in the series of archipelagoes included in the Vancouver Island and Queen Charlotte Island groups. The area of waters so enclosed, comprising the great gulfs, straits, fiords, inlets and canals, termed by mariners the Inner Passage, embraces the 'most extensive spawning and feeding grounds in the world for halibut, herring and numerous other food fishes.' [1]

From fifty to one hundred miles west of the main islands of these archipelagoes the continental shelf drops off to extreme depths, but from that margin inward and eastward the ocean bed forms a plateau at from twenty to two hundred fathoms ; this plateau forms the great feeding and spawning banks for many varieties of fish.

Ocean currents and tidal drifts have an important influence upon fish and the food of fish. The North Pacific or

[1] Dr E. H. Prince, 'British Columbia Fish and Fisheries,' in the *Pacific Fisherman*, January 1906, p. 31.

Japanese current, striking in easterly along the 50th parallel, divides as it reaches the continental shelf, one branch sweeping north, to be turned due west again where that shelf runs out once more into the Aleutian Archipelago; the other branch flows south as the California current, and forms a settled drift about fifty-five miles west of the Vancouver Island shore. These currents play to the coastal waters of British Columbia a part exactly similar to that of the Gulf Stream in its relation to the North Sea, whose limited waters have proved so rich in fish life as to feed for centuries a large portion of the population of North-Western Europe.

While nature has formed an ideal spawning and feeding ground for fish in these central waters, another notable fact is that the chief rivers of the Pacific take their rise in the watersheds of the province—the Fraser, the Skeena, and the Nass flowing entirely through Canadian territory; the Columbia and the Stikine taking their rise within, while they debouch beyond, its boundaries. This is, of course, closely correlated with the fact that the network of lakes which form the sources of these great rivers are, with the exception of the Great Lakes, the largest on the continent.

The importance of these latter facts in their relation to estuary fishing must be regarded. It has been largely the richness of the estuary fishing that has prevented or delayed the exploitation of the equally rich waters that wash the coasts of the province. It was the ease with which the salmon were taken in these straitened passes that diverted attention from the fisheries of the ocean.

While British Columbia is beginning to recognize the value of its fisheries, it is true also that the earliest industry, the fur trade, was largely possible because the rivers of the territory afforded abundant food for the Indians, half-breeds, and whites who pursued the fur-bearing animals. A glance at the journals of any post of the Hudson's Bay Company will reveal the extent to which dried salmon were relied on to sustain the employees during the year. Thus, chiefly because the salmon or estuary fishing was the most accessible, the history of British Columbia fisheries has been largely that of the salmon fisheries.

As early as 1825, however, it is apparent that the prospective value of the fisheries of the North Pacific was recognized by the respective governments of Great Britain and Russia, for in a treaty between these two nations, known as the Convention of 1825, there is an indirect reference to this.[1]

Beyond an occasional expedition to northern rivers for salmon when the supply ran short in southern waters, Russian territory was in little danger of receiving many visits from fishing vessels of the young British colony.

Although three schooners from Victoria accompanied an American fleet from Port Townsend in 1864 to engage in cod-fishing off the Shumagin Islands, few records remain that show any great activity in the exploitation of this source of food supply.

II

FISHERIES LEGISLATION

THE early journals of the Hudson's Bay Company and the records of the different posts throughout the province refer annually to the dried salmon obtained as food for their hunters, but reference is made to no other variety of fish. In 1863 it was apparently found necessary to protect the fisheries of the lakes of the province, since one section of the game act of that year prohibits netting any of these waters. It is probable, however, that such action was taken by the authorities of the colony through anxiety to prevent the trout with which the lakes teemed from being taken in an unsportsmanlike manner, rather than from any fear that too great a commercial exploitation was threatened.

[1] 'In order to prevent the Right of navigating and fishing, exercised upon the Ocean by the Subjects of the High Contracting Parties from becoming the Pretext for an illicit Commerce, it is agreed that the Subjects of His Britannic Majesty shall not land at any Place where there may be a Russian Establishment, without the permission of the Governor or Commandant; and, on the other hand, that Russian Subjects shall not land, without permission, at any British Establishment on the North-West Coast.'—Convention between Great Britain and Russia, 1825

No further reference to the fisheries is contained in any legislation of the colony of British Columbia. The terms of the union upon which British Columbia, in 1871, entered the confederacy of the Dominion of Canada, over and above the provisions of the British North America Act, which defined the charges which should devolve upon the federal government, placed upon the Dominion the obligation to defray the charges for 'Protection and Encouragement of Fisheries.'

The respective powers granted the provinces of Canada as opposed to those of the Dominion by the British North America Act were not clearly defined. In no quarter was a clear definition of these respective powers more desired than in British Columbia. The other provinces, however much they might desire the actual control of the fisheries and fishing, could not hope, were they to assume this, to throw any of the burden of the protection and encouragement of those fisheries, in other words, of the administration of them, upon the Dominion, hence they approached the question in a very different manner from that of British Columbia. While opinions differed as to the interpretation of the respective powers of the provinces and the Dominion in regard to fisheries, the reference of the case of the Dominion of Canada *versus* Ontario to the Privy Council in 1898 made several points clear. Briefly speaking, the Council decided that the Dominion of Canada has :

(1) Exclusive legislative jurisdiction over all matters pertaining to 'Sea Coast and Inland Fisheries.'

(2) Exclusive competence to enact fishery regulations and restrictions.

(3) The right to impose 'a tax by way of licence as a condition of the right to fish.'

The legislatures of the provinces have :

(1) All proprietary rights in respect of fisheries which they held before Confederation. This includes control of the manner by which a private fishery is transferred or disposed of, and the rights of succession in respect of it.

(2) The exclusive power to make laws in relation to matters coming under the caption, 'Direct taxation within

the Province in order to the Raising of a Revenue for Provincial Purposes.'

This has been interpreted by the Judicial Committee of the imperial Privy Council as empowering the provinces to lay a tax on provincial fisheries in addition to any imposed by the Dominion parliament.

As early as 1875 the then Dominion commissioner of Fisheries, W. N. Whitcher, advised the extension of the Canadian Fisheries Act to British Columbia. Prior to this, the act, under which the fisheries in other provinces were regulated, had no application west of the Rocky Mountains. When the act was extended to cover the Pacific fisheries it was found inapplicable in many ways. The inspector appointed in 1877 reported as follows :

> With regard to the provisions of the Fishery Act, at large, there are many portions which are necessarily inapplicable to this Province. The application, indeed, would in some cases neutralize all fishing operations ; for instance, of the salmon, at present the most lucrative. I have, therefore, assumed that such portions, only, of the Act, as are obviously of general application, with such other portions as, on more minute inquiry, may be found to be of particular application, shall be locally adopted. Without, therefore, interfering captiously and injuriously as I conceive, with existing practice, I shall continue as hitherto, to exercise a watchful surveillance for the common benefit ; reporting from time to time, the result of my observations, and under your sanction, extending such further protective portions of the law, as may be found necessary or expedient.

The first offence to which the attention of the department was drawn was the use of explosives in Burrard Inlet for killing fish. The inspector, in January 1877, reported that after visiting the inlet and making full inquiries, he found that the practice had prevailed ; but in view of the official notice he had received, and (as he himself stated) ' now that the law is known, the practice has been abandoned.' This prohibition formed section 3 of the General Fishery Regulations for the province approved by His Excellency the governor-general on July 18, 1889. These early regulations,

indeed, consisted of only three sections: (1) Salmon; (2) Trout; (3) Explosives. The following were the provisions:

Section 1—Salmon

(1) Fishing by means of nets or other apparatus without leases or licences from the Minister of Marine and Fisheries under the provisions of Chapter 95, Revised Statutes of Canada, and section 4 thereof, is prohibited in all waters of the province of British Columbia.

Provided always, that Indians shall at all times have liberty to fish for the purpose of providing food for themselves, but not for sale, barter or traffic, by any means other than with the drift nets or spearing.

(2) Meshes of nets used for capturing salmon shall be at least six inches extension measure, and nothing shall be done to practically diminish their size.

(3) *a.* Drifting with salmon nets shall be confined to tidal waters, and no salmon net of any kind shall be used for salmon in fresh waters.

b. Drift nets shall not be used so as to obstruct more than one-third of any river.

c. Fishing for salmon shall be discontinued from 6 o'clock A.M. on Saturday to 6 o'clock A.M. on the following Monday, and during such close time no nets or other fishing apparatus shall be set or used so as to impede the free course of the fish, and all nets or other fishing apparatus set or used otherwise shall be deemed to be illegally set and shall be liable to be seized and forfeited, and the owner or owners, or persons using the same, shall be liable to the penalties and costs imposed by the Fisheries Act.

(4) *a.* Before any salmon net, fishing boat or other fishing apparatus shall be used, the owner or persons interested in such net, fishing boat or fishing apparatus shall cause a memorandum in writing setting forth the name of the owner or persons interested, the length of the net, boat or other fishing apparatus, and its intended location, to be filed with the Inspector of Fisheries, who, if no valid objection exists, may, in accordance with instructions from the Minister of Marine and Fisheries, issue a fishery licence for the same, but any net, fishing boat or fishing apparatus used before such licence has been obtained, and any net, fishing boat or fishing

apparatus used in excess or evasion of the description contained in such licence shall be deemed illegal and liable to forfeiture, together with the fish caught therein, and the owner or person using the same shall be also subject to fine and costs under the Fisheries Act.

b. All salmon nets and fishing boats shall have the name of the owner or owners legibly marked on two pieces of wood or metal attached to the same, and such mark shall be preserved on such nets or fishing boats during the fishing season in such manner as to be visible without taking up the net or nets ; and any net or fishing boat used without such a mark shall be liable to forfeiture.

(5) *a.* The Minister of Marine and Fisheries shall from time to time determine the number of boats, seines or nets, or other fishing apparatus to be used in any of the waters of British Columbia.

Section 2—Trout

No one shall fish for, catch or kill trout from the 15th day of October to the 15th day of March, both days inclusive, in each year.

Provided always that Indians may, at any time, catch or kill trout for their own use only, but not for the purpose of sale or traffic.

Section 3—Explosives

The use of explosive materials to catch or kill fish is prohibited.

These regulations were on March 14, 1890, amended in four particulars : (1) The six-inch mesh for drift-nets was reduced to five and three-quarter inches ; (2) a proviso enabled the minister to order the use of a mesh larger than five and three-quarter inches where in his opinion it was necessary ; (3) the weekly close time was changed to six P.M. Saturday to six P.M. Sunday ; (4) the use of seines was prohibited throughout British Columbia. On November 7 of the same year a prohibition of salmon seines was legalized by regulation.

In the summer of 1890 a commission of inquiry was authorized to investigate certain matters relating to the

fishery regulations, with special reference to salmon-fishing for canneries. The commissioner was Samuel Wilmot, who, in August 1890, made a full investigation of the Fraser River fisheries, visiting the seventeen canneries on the river and obtaining the views of the leading men engaged in the industry. Wilmot's investigation resulted in further changes in the law.

In June 1892 nine new clauses or sections were added, limiting the number of licences to be granted to individual fishermen, to canners, dealers and parties engaged in freezing salmon, or in shipping them on ice or in curing them. One provision limiting licences to resident British subjects caused much bitter feeling, as it excluded a large number of men who came north to the Fraser River after the season on the Columbia and Sacramento Rivers was over. These United States fishermen were much chagrined to find the salmon-fishing in British Columbia confined to British subjects. Many canners were anxious to encourage this foreign labour, and it was publicly asserted that various means were resorted to in order to evade the regulation. Personation in order to obtain licences, and nefarious naturalization of ineligible persons were among the charges made, and much resentment was aroused among the British fishermen. Grave abuses indeed continued, and to correct them a system of registration was adopted. This brought to light the fact that a considerable number of aliens still obtained fishing privileges in the British Columbian salmon fisheries. The proposed rigid enforcement of the registration scheme and the 'resident British subjects' requirement in 1899 caused apprehension.

The *Fishing Gazette* in March 1899 said

> The enforcement by the Dominion government of the law compelling all fishermen on the Fraser River to register with the proper authority at Victoria on or before April 1 is causing serious apprehension. Without this registry they cannot fish the coming season, and every person registering must be a British subject. Unless this law is amended it will cut down the number of boats from an estimate of 6000 to about 2500, for

FISHING FLEET AT THE MOUTH OF THE FRASER RIVER

> fishermen who have gone from California and Oregon to the Fraser River to fish cannot do so under the present law, and this means a large cut in the 1899 pack of British Columbia.

Much dissatisfaction continued to exist among those engaged in the salmon fisheries, and the recommendations made at the close of Wilmot's inquiry were severely criticized. Great objection was made to them, and the whole report was unfavourably regarded by many of the salmon canners and their agents, who complained bitterly of the representations made by Wilmot (regarding the wholesale destruction of fish and the universal custom which prevailed, contrary to law, of throwing all offal from the canning establishments into the river) as well as the conclusions arrived at generally in his report.

With a view to determining the accuracy of the report, as well as to obtaining data and information on many other points respecting the river and deep-sea fisheries of the province, upon which, until Wilmot's report was made, the department had been inadequately informed, a minute of council, based upon the recommendations of the minister of Marine and Fisheries, was approved on December 23, 1891. This minute of council appointed a commission consisting of D. W. Higgins, speaker of the British Columbia legislative assembly, William Armstrong, sheriff of New Westminster, and Samuel Wilmot, superintendent of fish culture, 'to inquire into and report upon the fisheries and fishery regulations of the province of British Columbia.' Charles F. Winter, of the headquarters staff of the Fisheries department, was detailed for duty and accompanied the commission as secretary.

The commission was convened and held its first session at the court-house in New Westminster on February 19, 1892 (Samuel Wilmot being elected chairman), and proceeded to take evidence from day to day and hear testimony from the fishermen and all other parties vitally interested in matters affecting the fisheries of the province. The sittings were continued at Victoria, Nanaimo, and Vancouver, the final executive sessions being held on March 19,

1892. The recommendations of the commission became, in the main, the regulations that existed until 1908, although amendments added to their range and extent.

In 1895 the commissioner of fisheries was authorized to carry on an inquiry and hold sittings at New Westminster, Steveston, and other centres of the Fraser River salmon fisheries. The investigation was completed and a number of recommendations made which were at a later date embodied in further amended regulations.

In 1898 the decision of the Privy Council in the case of the Dominion of Canada *versus* Ontario was rendered, and in this decision the property rights of the province in fish were defined. As dissatisfaction among the canners continued to be expressed, representations were made to the provincial government urging it to assert such jurisdiction as it might possess, and even to endeavour to conclude an arrangement with the Dominion under which the province would assume sole jurisdiction over the fisheries.

In 1901 the Provincial Fisheries Act was passed, which provided for the making of regulations for the better conduct of the fisheries, for the construction of hatcheries, and for the appointment of a commissioner of fisheries, a deputy commissioner, and other necessary officers. In January of the same year the provincial government appointed John Pease Babcock, a well-known fishery expert of California, to the position of deputy commissioner, and negotiations with the Dominion were entered upon, which it was hoped would lead to the acquisition of control by the province.

At this time it was pointed out that of the total revenue paid into the Dominion treasury by the fisheries of Canada in 1900, British Columbia contributed $53,000 out of a total of $79,000, or 66 per cent of the whole, whereas the total expenditure on fisheries in that province represented not one-sixth of the total amount expended in Canada for this service.[1] The Dominion government was not disposed at this time to enter into the desired arrangements, and it

[1] Memorial to the Premier and Council of the Government of British Columbia from sixty of the seventy-four canners operating, dated April 10, 1901. House of Commons Debates, *Hansard*, Tuesday, April 30, 1901.

was determined that the Privy Council should be asked to define more clearly the respective powers as to fisheries of the Dominion and the province, and pending the result of such a reference a *modus vivendi* was concluded under which a moiety of the licence fees collected in British Columbia by the Dominion should be paid over to the provincial government. As feeling continued acute among the canners and fishermen, a commission consisting of Professor E. E. Prince, George R. Maxwell, M.P., Aulay Morrison, M.P., and Ralph Smith, M.P., was appointed. Sixteen sittings were held in 1901, and certain minor changes in the regulations were carried out; these, however, did not allay the criticisms.

In this year also the Dominion constructed a second hatchery at Granite Creek on Shuswap Lake, one of the sources of the Fraser, with a capacity of 10,000,000 eggs; and the next year John Pease Babcock reported to the provincial government upon a hatchery system for the Fraser River. He urged that a hatchery should be constructed at Seton Lake to form a part of a system that would have a main unit on the Harrison Lake-Lillooet Lake watershed. The provincial authorities adopted in part his recommendations, and a large hatchery, completed in 1903, was constructed at the point recommended.

But while more attention was directed towards the artificial propagation of salmon, the belief was growing that a crisis in the great salmon industry had been reached. Owing to the fact that the main schools of salmon passing from the sea to the Fraser River to spawn traverse a portion of the State of Washington, where no protective regulations along the lines enforced in Canada were carried out, the Fraser River salmon industry had been seriously injured. That the permanence of the runs had been affected was contended by Babcock for the provincial government, and it was felt that artificial propagation alone could not keep pace with the fishing, which had largely increased on both sides of the line.[1] An understanding with the State of Washington was believed necessary, and as with the increased demand

[1] Reports of the Commissioner of Fisheries of British Columbia, 1902, 1903-4.

for salmon exploitation of the fisheries throughout the province had proceeded, the necessity for a general inquiry by a competent commission was recognized.

In July 1905 an order-in-council was passed by the Dominion government appointing a commission to inquire into fishery matters in general in British Columbia. It was composed of Professor E. E. Prince, Dominion commissioner of fisheries, Campbell Sweeny, Vancouver, J. C. Brown, New Westminster, Richard Hall, Victoria, the Rev. George W. Taylor, Nanaimo, and John Pease Babcock, deputy commissioner of fisheries for British Columbia. In December 1905 the commission presented an interim report recommending :

1. That in the interest of the British Columbian fisheries a satisfactory adjustment of the differences between the Dominion and provincial governments be as far as possible hastened.

2. That the territorial or non-territorial character of Hecate Straits waters be declared as soon as possible. If these waters are held to be Canadian, then foreigners are fishing there illegally.

3. That immediate measures are necessary to limit the number of canneries on Rivers inlet, Skeena river, etc., or the fisheries there will be in danger of depletion. The inspector (Mr Williams) should be instructed that the number of boat licences at present be : Rivers inlet 550 ; Skeena river 800 ; Nass river 200.

4. That a more efficient patrol of British Columbian waters be arranged in order to suppress the existing extensive poaching.

5. That a survey of the fishing grounds in British Columbia be carried out under the present Biological Board of Canada.

6. That all natural and artificial obstructions be reported on and removed from British Columbian salmon rivers.

7. That the present snag-boat be transferred to Nass river, and a more powerful snag-boat take its place on the Skeena river.

8. That the prohibition of the export of fresh herring from British Columbia in 1905 and 1906 be withdrawn.

In 1906, in addition to other recommendations, the commission urged that the regulations should be amended so as to allow trap-nets west and south of Discovery Island, or along the south-west coast-line of Vancouver Island. The latter recommendation was given effect at once, so that a portion of the Fraser River salmon run could be taken before reaching the American waters of Puget Sound. The commission completed its sessions in 1907 and rendered a report, recommending the size of nets to be used on the Fraser, that the weekly close seasons should be increased, that fishing should be permitted to Mission Bridge, and that the patrol service should be greatly increased.

The commission met delegates from the State of Washington, and a formulated statement of views and recommendations was adopted providing for a longer weekly close season, subject to a condition that the Washington special fish commission should make similar recommendations to the State legislature of Washington. Unfortunately the recommendations of the Washington committee were not ratified by the legislature, with the result that no alleviation of the unsatisfactory conditions on Puget Sound was secured.

When the commission reported no immediate action was taken by the government at Ottawa to carry out in regulations the recommendations of the body. According to the canners the chief trouble in Dominion administration of the fisheries of British Columbia has always arisen from the fact that invariably the responsible minister at the head of the department has been an Eastern man, with no knowledge of conditions in the West, although he might have a comprehensive knowledge of conditions on the Atlantic seaboard. Usually, too, he was surrounded by officials largely chosen from the Maritime Provinces or Quebec, who had only the faintest conception of actual conditions on the Pacific coast, where the fisheries are totally different and their operation almost entirely dissimilar. The canners further maintained that, although much might be said for central control in other directions, the situation in regard to fisheries was different. Removal of the jurisdiction to Ottawa and the placing of it in the hands of ministers or officials not

intimately acquainted with its details, so far from preventing, rather encouraged the 'playing of parish politics' or the favouring of political friends at the expense not of political foes, but of those actually engaged in the industry. Dependent upon others for his knowledge of conditions, the minister at Ottawa was apt to be misled by misrepresentations from political friends with a selfish interest, and at the same time he was not so directly susceptible to the influence of, or in touch with, public opinion in the district affected.

When no action was taken upon the findings of the commission of 1905-7, although no reference had as yet finally decided the powers of the provincial government, a more decided policy was adopted by the province following the appointment of W. J. Bowser to the portfolio of attorney-general and commissioner of fisheries in the government of British Columbia. At his instance an act known as the Canneries Revenue Act was passed in the legislative session of 1908. This act required any person operating a salmon cannery first to obtain a licence from the provincial commissioner. Discretionary powers were granted the commissioner as to whether or not a licence should be issued. In this way the province took power to prevent an undue number of canneries beginning operations within a limited area. The Dominion government followed suit in a series of regulations enacted later in the same year, which required the possession of a Dominion cannery licence before operating and also embodied the major portions of the recommendations of the commission of 1905-7. As a result of these regulations practical effect was given to the recommendations of the commission urging cannery limitations in the north, but nothing was done to embody the suggestion to limit the number of boats that would be allowed to fish in northern waters.

With the growing demand for salmon the canners continued to increase their packs, and presently it began to be feared that were additional protective measures not adopted in the waters of the north, exclusively British, and where no international complications ensue as in the Fraser-Puget Sound district, these resources would be depleted.

During the season of 1909, when it became apparent that the canners of the Nass, the Skeena, and Rivers Inlet were preparing to increase largely the number of their boats, the provincial government once more stepped in. By an order-in-council, passed early in 1910, a limitation of 855 boats for the Skeena, 750 for Rivers Inlet, and 240 for the Nass River was set. These boats, moreover, were assigned among the existing canneries. The Dominion government again followed the lead of the province, and in 1910 a commission, composed of John T. Williams, inspector of fisheries for Northern British Columbia, and John Pease Babcock visited the different salmon-fishing districts of the north and recommended a boat-rating differing little from that placed in effect by the province in the previous year.

The gradual entry of the Japanese into the coast fisheries, which they practically control, so far as the actual fishing is concerned, has been an object of concern to all who have given any thought to the question. In the salmon fisheries of Northern British Columbia, out of 1900 men employed in gill-netting in 1911, over 1000 were Japanese, while the same proportion is observed in the salmon fisheries of other portions of the province. They possess similar control of other branches of fishing. The matter engaged the attention of both the Dominion and provincial authorities, and in 1911, after a conference between the Hon. J. D. Hazen and the Hon. W. J. Bowser, the Dominion and provincial heads of the Fisheries departments, it was resolved that an inquiry should be held for the purpose of recommending some changes in the salmon fisheries regulations designed to encourage the settlement of white fishermen in Northern British Columbia.

In the summer of 1912 W. A. Found, superintendent of fisheries for the Dominion, was dispatched to the coast, and with the present writer, deputy commissioner of fisheries for the province, toured the entire northern district. A report was prepared and recommendations were submitted to the two departments. The report, which was adopted by both departments as an inducement to white fishermen to settle in the northern districts of the province, offered

special privileges, licences to fish for salmon independently of the canners, and advantages over and above those held by the fishermen, largely Japanese and Indians, who operated for the canneries with cannery gear and who were financed by the packers.

The arrangement, which at present (1913) has only been in force a few months, has been fairly successful, and it is expected that it will induce additional participation by whites in the fisheries of the north. The recommendations of the two officials further provided that, while the total limitation of the boats allowed to fish in the northern rivers should be continued as a protective measure for the fish, the assignment of boats to canneries should be gradually decreased as the immigration of white fishermen grew in volume.

While both the Dominion and the province had been seeking since 1901 a definite decision as to their respective jurisdictions, no formal action was taken until June 1910, when it was decided to refer the following questions to the Supreme Court of Canada for consideration :

> 1. Is it competent to the Legislature of British Columbia to authorize the Government of the Province to grant by way of lease, licence or otherwise the exclusive right to fish in any or what part or parts of the waters within the Railway Belt, (a) as to such waters as are tidal, and (b) as to such waters as although not tidal are in fact navigable ?
>
> 2. Is it competent to the Legislature of British Columbia to authorize the Government of the Province to grant by way of lease, licence or otherwise the exclusive right or any right to fish below low water mark in or in any or what part or parts of the open sea within a marine league of the coast of the Province ?
>
> 3. Is there any and what difference between the open sea within a marine league of the coast of British Columbia and the gulfs, bays, channels, arms of the sea and estuaries of the rivers within the Province, or lying between the Province and the United States of America, so far as concerns the authority of the Legislature of British Columbia to authorize the Government of the Province to grant by way of lease, licence or otherwise

the exclusive right or any right to fish below low water mark in the said waters or any of them ?

In November 1912 formal argument was heard and the Supreme Court decision in February 1913 negatived the contentions of the province. Leave to appeal was granted by the Privy Council in May 1913, and on December 2 of the same year a judgment was delivered reaffirming the decision of the Supreme Court. As a result of this decision, it is finally established that, while the province is not debarred from collecting licence fees under its powers of direct taxation, it has no right to regulate the fisheries in tidal waters.

In 1912 an agreement was entered into between the Dominion and the province under which the sole right to lease areas of foreshore, including those within public harbours, for the purposes of oyster culture, was assumed by the province. The divided jurisdiction had prevented the proper fostering of this important source of food supply, and it is expected that, with assured tenure, improved methods of cultivation will be practised.

In the same year attention began to be directed more particularly to the deep-sea fisheries, and three trawlers were brought to the coast from Great Britain. While the inshore fisheries are rich enough to warrant exploitation by this approved manner of fishing, it is feared that the rocky ocean bed will militate against successful trawling. Attention has, however, been directed to the profitable field offered for this kind of fishing by the great banks of food fishes existing off the Aleutian Islands in the open ocean. These banks are nearer the ports of British Columbia than they are to Japan, yet their exploitation of late years by fishing vessels from the latter country has been very extensive. While but few trawlers operated from Japan in 1910, in the year 1911 seventy-seven, with a total tonnage of 13,500, were laid down in Japanese shipyards. Almost an equal number were built, or purchased, abroad, to engage in this fishing. Hakodate, the nearest Japanese port, is nearly five hundred miles farther from the centre of these fisheries than is Prince Rupert. The latter port, the most northerly transcontinental railway

terminus on the continent, seems destined, with the proper exploitation of the fisheries of the North Pacific by British crews from British Columbia, to develop into the most important fishing centre in the world.

III

THE VERTEBRATES

THE Pacific coast salmon, observed by Steller, a German naturalist in the employ of Russia, as early as 1731 on the Siberian coast, were again encountered by him in 1741, when he accompanied Vitus Bering on his fatal voyage towards the western coast of America. Almost simultaneously the genus was described by Krascheninikov, another early investigator. Steller described them perfectly under their native Russian names, and this nomenclature was adopted by Walbaum in 1792. The fish wrongly called salmon at the outset has to-day ousted the rightful salmon of the name, for the genus *oncorhynchus* in its five species is the salmon of commerce, and in its canned form is known as salmon throughout the world.

The Pacific coast salmon is not the *salmo salar*, the salmon which the Romans found running to the rivers of Gaul and Britain in great quantities, and which, preserved in snow, was sent to the imperial city and throughout the Empire. The salmon of the Pacific coasts of North America and Asia, all five species of which run in great quantities to the rivers of the coast, are of the genus *oncorhynchus* or hook-nose. It differs from the *salmo salar* in points of structure, although the external form of both is similar. The anal fin in the *oncorhynchus* has from thirteen to twenty rays, while that of the *salmo salar* has never more than twelve. These five species ascend the rivers between the months of April and December in great numbers, crowding the shallows at the heads of the streams, some travelling a full two thousand miles from the ocean.

While the structural differences between the Atlantic and the Pacific salmon are not very apparent, the chief distinction

INDIAN SALMON CACHES, FRASER RIVER

in their life-history arises from the fact that, in the case of the Pacific, of all the host which ascend the stream to spawn none return. The distance to which they go has no bearing upon this fact. As soon as they have discharged their breeding functions, all begin to weaken, and soon die. It is the young, returning to the sea in from a year to fifteen months after being hatched, that perpetuate the genus. Commercially the salmon is the most important of American fishes, the annual pack of the Pacific coast being valued at from $15,000,000 to $25,000,000. The value of the salmon pack of British Columbia for the year 1911 has been estimated at $9,851,897 and in 1912 at $9,540,368.

The five species of *oncorhynchus*, all of which are abundant in the waters of British Columbia, in the order of their importance are as follows :

Oncorhynchus nerka (sockeye or blue-back salmon).
Oncorhynchus tschawytscha (quinnat, tyee, king or spring salmon).
Oncorhynchus kisutch (coho or white salmon).
Oncorhynchus keta (dog or chum salmon).
Oncorhynchus gorbuscha (humpback or pink salmon).

Sockeye Salmon

The sockeye run in all the mainland rivers, in some of the rivers of the west coast of Vancouver Island, and in the Nimpkish River near the head of the east coast of the island. The abundance of this fish in the Fraser varies greatly with given years, distinguished by the canners as the ' big years ' and the ' poor years.' Their movement is greatest every fourth year. In the cycle of four years commencing with 1913, the latter is a ' big year ' and the run is poorer in the three years immediately following. The causes which have led to this most remarkable feature have given rise to much speculation, and many theories have been advanced to account for the runs. None, however, are satisfactorily established. The periodicity in the run of sockeye which is so pronounced in the Fraser has no marked counterpart in any other river in the province or on the coast.

The sockeye weighs as a rule from three to ten pounds,

though specimens weighing seventeen pounds are recorded. The adults in salt water are free from spots, their backs are a clear blue, and below the lateral line the colour is an immaculate white. The flesh is of a deep and unfailing red. In form and colour they are considered the most beautiful of their family. They enter the Fraser River as early as April, but are not taken until July 1, and their capture is by regulation confined to nets of five and one-half inch mesh. The main run in the Fraser is looked for towards the latter part of July and is at its height during the first ten days of August. The spawning period of the sockeye extends from August, in the head-waters, to as late as October or November in the waters nearest the sea, the spawning taking place in lake-fed or in lake-feeding streams.

Spring or Quinnat Salmon

This class ranks second in importance in the waters of the province, and was the first, and for many years the only, salmon used for canning. The species attains an average weight of from eighteen to thirty pounds in British Columbian waters, though fish weighing from sixty to one hundred pounds have been reported. The head is rather pointed and of a metallic lustre ; the back is a dark green or bluish colour, while below the lateral line it is silvery. At spawning it becomes almost black, hence it is often spoken of on the spawning grounds as ' black salmon.' It is the most powerful swimming fish that seeks the rivers of British Columbia, usually journeying to the extreme head of the stream that it enters. It seems to prefer the most rapidly flowing streams, apparently avoiding the lake-fed tributaries. The colour of the flesh is from a deep red to a very light pink—at times almost white. This uncertainty of colour militates against its use for canning purposes. All specimens are examined by the canners before being accepted from the fishermen, the fish with unusually pale flesh being almost invariably rejected. The quinnat enters the Fraser, the Nass, and the Skeena early in the spring, and the run continues more or less intermittently until July. In the fall there is no pronounced run.

Coho Salmon

This species is found in all the waters of the province and of recent years has become a considerable factor in canning operations. The bulk of the catch, however, is shipped in ice to Eastern markets. Its average weight is from three to eight pounds, though heavier specimens are not uncommon. In colour it is very silvery, greenish on the dorsal aspect, with a few black spots on the head and fins. In August and September the runs take place in the rivers of the north-west coast, and in September and October in the Fraser. Like the sockeye, the coho salmon travels in compact schools. It does not seek the extreme head-waters, but frequents both the streams and the lakes to spawn.

Dog Salmon

These fish run in most of the rivers and coast streams late in the fall. The average weight is from ten to twelve pounds, but much larger specimens are not unusual. They spawn close to the sea. They are dark silver in colour, the fins being black, but during the spawning season they become dusky, with lateral lines of black. There is more or less grey and red colouring along the sides. The heads of the males undergo the most remarkable distortion, while the teeth in front become large and dog-like ; it is from this latter characteristic that the species has derived its popular name. Until a few years ago these fish were not considered of any value, but they are now captured in great numbers by the Japanese, who dry-salt them for export to the Orient. Latterly a market for the canned product has been developed.

Humpback Salmon

This is the smallest of the species of salmon found in British Columbian waters, averaging in weight from three to six pounds, In colour it is bluish above and silvery below, while the back and the tail are covered with oblong black spots. In the fall the males are so greatly distorted as to give them their popular name. The fish run in abundance in the 'big years,' and then only every second year, coming in with

the last of the sockeye run. They are but little valued, though a considerable demand has sprung up within the past few years.

With the development of the markets for cheap fishery products a demand has come for all the varieties of salmon, with the result that the fishing season has now been extended to cover the runs of all five species. This lengthening of the season is of marked benefit to the regular salmon fishermen, and, with the development of other fisheries, it is believed they may find regular employment during the entire year.

Life-History of the Pacific Salmon

With the exception of the quinnat[1] little was known of the life-history of the Pacific salmon until 1912.

In 1903 John Pease Babcock conducted a series of investigations into the movements and life-history of sockeye fry, and established the fact that there are two well-defined migrations of the young sockeye seaward, one within three months of the absorption of the yolk-sac after spawning, the second a year later; in other words, that sockeye fry proceed to sea at an age of three months or fifteen months.

It was not until Dr C. H. Gilbert, of Leland Stanford, Jr. University, gave to the world in 1912 the result of his researches into the age of salmon through scale readings, after the system discovered and perfected by scientists in the employ of the Scotch Fishery Board, that progress was made. His chief deductions were as follows:

The sockeye spawn normally either in the fourth or fifth year, the spring salmon in the fourth, fifth, sixth, or seventh year, the females of each species being preponderatingly four-year fish.

The young of both sockeye and spring salmon may migrate seaward shortly after hatching, or may reside in fresh water until their second spring. Those of the first type grow more rapidly than those of the second, but are subject to greater dangers and develop proportionately fewer adults.

[1] Claudesly Rutter, *Natural History of the Quinnat Salmon*: a report on investigations in the Sacramento River, 1896-1901.

Coho salmon spawn normally only in their third year. The young migrate either as fry or as yearlings, but adults are developed from those that migrate as yearlings.

Dog salmon mature normally in either their third, fourth, or fifth year, the humpback always in their second year. The young of both species pass to sea as soon as they are free-swimming.

The term 'grilse' as used for Pacific salmon signifies conspicuously undersized fish which sparingly accompany the spawning run. They are precociously developed in advance of the normal spawning period of the species. So far as known the grilse of the spring salmon, coho, and dog salmon are exclusively males, except in the Columbia River, where both sexes are equally represented. The larger grilse meet or overlap in size the smaller of the fish that mature one year later at the normal period.

Grilse of the sockeye are in their third year, of the spring salmon in their second or third year, of the coho and dog salmon in their second year.

The great difference in size of the individuals of a species observed in the spawning run is closely correlated with age, the younger fish averaging constantly smaller than those one year older, although the curves of the two may overlap.[1]

The Salmon Canning Industry

The first attempt to can salmon on the Fraser was made in 1876. Alexander Ewen built a cannery a little below New Westminster, and later in the same year two other plants were constructed adjacent to this. Ewen's is generally considered to have been the first cannery in British Columbia. It may be stated on good authority, however, that while the honour of being the pioneer in the salmon canning industry on the Pacific coast is given to an American, William Hume, who in 1864 constructed a plant on the Sacramento River in California, salmon was actually canned in British

[1] Charles H. Gilbert, Professor of Zoology, Leland Stanford, Jr. University, *Age at Maturity of the Pacific Coast Salmon of the Genus Oncorhynchus*: published by Bureau of Fisheries, Washington, D.C., 1912.—Report of the Commissioner of Fisheries for British Columbia, 1912.

Columbia at least two years previously. Captain Edward Stamp, of the British mercantile marine, who settled at Alberni on the west coast of Vancouver Island in 1860, and engaged in the lumber business, at some time between the years 1860 and 1862 preserved in two-pound tins a quantity of salmon; tins of the product opened in 1896 were of excellent flavour and perfectly preserved.

In 1877 the three canneries operating on the Fraser were increased in number to five, and in the same year a cannery was located at Inverness on the Skeena River. In the following year eight canneries operated on the Fraser, an additional plant, the Oceanic, was constructed on the Skeena, and a plant was completed and placed in operation at Mill Bay on the Nass River. The industry grew rapidly, until in 1883 thirteen canneries were operating on the Fraser, which in that year produced a pack of 199,000 cases. Five plants were operating on the Skeena, two on the Nass, and one, which had been erected during the previous year, on Rivers Inlet.

In 1883, too, the fact that the salmon, on their way from the open ocean through the Strait of Juan de Fuca to the Fraser River, circled around in Puget Sound and the Gulf of Georgia before entering the river, caused canneries to be established at Seattle, San Juan, Bellingham, Blaine, and Port Townsend, and resulted in the birth of a vexed international question.

For several years previous to 1883 representations had been made to the Dominion government of the need of the artificial propagation of salmon in the province, but it was not until 1884 that the Dominion commenced the construction of a hatchery at Bon Accord on the Fraser River. This hatchery was completed in the following year. The industry made no particular progress for several years, but in 1893 twenty-two canneries operated; in 1898 these had increased in number to thirty-five and a year later to forty. The pack of salmon had proved fairly satisfactory, the notable periodicity in the run of salmon to the Fraser effecting a large pack in one out of four years, with a very much smaller one in the three succeeding years.

SALMON TRAPS, FRASER RIVER

Halibut

On the Pacific coast the halibut industry is ranked next in importance to the salmon. The halibut belong to the flounder family. Three varieties of this fish are found on the Pacific coast—the arrow-toothed (*Atheresthec stomias*), the Monterey or Bastard (*Paralichthys californicus*), and the common halibut (*Hippoglossus hippoglossus*). The last mentioned is found all along the coast from Bering Strait as far south as San Francisco, its centre of abundance, according to some authorities, being the Gulf of Alaska in the vicinity of Kadiak and the Shumagin Islands, where the extensive banks furnish a favourite habitat for the big flat fish. It is only latterly, however, that these banks have been fished to any extent, as an abundance of the fish have been taken much nearer the coast's markets. A large bank formerly rich in halibut exists off Cape Flattery in the mouth of the Strait of Juan de Fuca. With increased fishing this bank has become depleted, and the fishermen are compelled to go farther afield to the banks of South-Eastern Alaska, to Dixon Entrance, to Hecate Straits, and to the fringe of shallow water around Vancouver Island. The method of fishing for halibut is by hand-line from dories operating from a steam or gasoline mother vessel. The industry had its inception about 1885, when a few schooners from Port Townsend in the State of Washington began to fish off Cape Flattery. For many years it languished, as the local demand was limited, and the existing means of transport did not permit of shipment to the Eastern markets, which at that time were well supplied from the Atlantic fisheries; but with increased centres of population farther west and the decline of the Atlantic catch, the perfecting of cold-storage plants and transport and fast freight service, the Pacific halibut has become a staple in the fresh fish markets of the East. The production grew from 6,877,640 pounds in 1899 to 21,706,000 in 1909 for the entire Pacific coast. Of this one-half was taken by vessels operating from Canadian ports, while a large proportion of the catch of American vessels was taken by them in Canadian territorial waters.

Much of the Canadian catch has been handled by an American firm, the New England Fish Company, which has a bonding privilege under which it is allowed to ship its fish through Canada to the Eastern United States markets, which it enters free of duty.

Halibut are taken practically all the year round, being found extensively from September to March in Dixon Entrance and Hecate Straits, while during the months of May and June many are taken along the inshore shallows of the east coast of Graham Island and the west coast of Vancouver Island.

Flounders

Many members of the halibut family, coming under the name of flounders, are found in these waters, all possessing more or less value as food fishes. Certain varieties of these fish are locally known as ' turbot,' while others are marketed as ' soles,' though there are no true turbot or soles in the North Pacific. The catch of these fishes is limited to the local demand. Among the varieties are the following: large-eyed flounder, large-scaled flounder, hook-toothed flounder, long-finned flounder, short-finned flounder, bastard turbot, spine-checked turbot, black-tailed sole, black-dotted plaice, and many others which are locally marketed as sole.

Oulachan

(*Thaleichthys pacificus*, Richardson)

This small fish—about the size of a smelt—occurs in great abundance from the Nass River in the north to the Fraser River in the south, appearing from early March to the middle of April. The schools entering the northern estuaries—especially that of the Nass—are very large; they crowd in so thickly that the Indians, from an early period, have been accustomed to make large catches by crude methods, the chief of which is the use of a long pole with numbers of nails inserted about one and one-half inches apart and projecting like the teeth of a comb. By drawing this implement through the dense school of fish the Indian

impales a great number, which he shakes off into his canoe ; in a short time he is able to obtain a boat-load in this primitive manner. Seines are used in some localities, as also are small-meshed gill-nets.

The tissues of the oulachan teem with oil—so much so that it is called the ' candle-fish,' for by simply inserting a piece of pitch through the centre of it when dried, it may be used as a candle or torch, the pitch burning like the wick of a well-filled lamp. The Indians are accustomed to press out the oil into vats. It is greatly esteemed by them, although it quickly turns rancid and is very offensive in odour. They consume it in the same way, and to the same extent, that butter is consumed by more civilized people.

Herring

(*Clupea pallasii*, Cuvier)

The superabundance of herring on the coast of British Columbia has been recognized from early times, but as the local demand was insignificant, no herring fishery can be said to have existed until about thirty years ago. At intervals, and in a desultory way, many people engaged in the herring industry, and quantities of the fish were converted into oil and guano. Within the last ten years, however, the value of this fishery resource has gradually been realized.

Herring occur practically all along the coast as far as Alaska. In sheltered areas, like the waters near Nanaimo, Ucluelet, Barkley Sound, Virago Sound, and near the Queen Charlotte Islands, the schools appear to form solid phalanxes. At Nanaimo they are plentiful from early in November until the New Year, vast schools appearing in February, while even as late as June immense quantities have been seen moving out in the Strait of Georgia.

There are many methods of putting up herring, but the greatest demand is for the article in pickle, and there is no reason why the province should not put up as large a pack of the best herring as Scotland, which produces annually from 250,000 to 350,000 tons, valued, when pickled and ready for market, at no less than from $5,000,000 to $6,000,000.

The possibilities of the herring industry are large, and, properly conserved and exploited, it will become a valuable source of revenue to the whole province. At present the industry is largely in the hands of Japanese, who dry-salt the product for export to the Orient.

Sturgeon

(*Acipenser transmontanus*)

The sturgeon fishery of British Columbia was neglected until late years, but in 1897 the Fraser River inspector reported that 'the sturgeon fishery has become a very important industry—the more important as it affords employment to a large number of resident fishermen who would otherwise spend their time in an idle or unprofitable manner. The proceeds of the industry are upwards of $50,000, the fish being dressed and shipped to United States markets.'

It is doubtful if the sturgeon has, in any numbers, ever frequented the northerly rivers of the province, and it is on the Fraser River alone that any fishery of much commercial value has been developed. Sturgeon may be found in the river during most months of the year, but it migrates to the sea from the fresh water, especially about the middle of April, or even as early as February. The Indians formerly were accustomed to take sturgeon by means of trawls with long lines and baited hooks. Gill-nets were licensed by the government some years ago, and for three or four years there was quite a boom in sturgeon-fishing. In fact, so remunerative did the fishing prove, that a large body of men immediately engaged in it, with the result that in three years the catch fell to one-fifth of what it had been a short time before.

Vast numbers of small sturgeon are seen by the Fraser River salmon fishermen at the present time, and this leads to the belief that, with the enforcement of the present Dominion regulations, the fishery will in due time be restored to its former state. This is greatly to be desired, since the industry is carried on after the close of the salmon-fishing, and good earnings can be made.

Pilchard and Anchovy

(*Engraulis mordox* and *Anchovis delicatessima*)

These two valuable species are found more or less abundantly in Southern British Columbian waters. The first named is caught along with the herring on the eastern and western shores of Vancouver Island. It is said also to be very numerous in Barkley Sound and adjacent inlets. In its small, immature stages it is the ' sardine ' of France. Investigation along the Pacific coast reveals the resorts of these fish, and shows that a canned sardine industry, which would successfully compete with the greatly esteemed European article, is possible.

That the true anchovy is a British Columbian fish has long been known ; but the migrations of this valuable species are at present not ascertained. Once known, however, the British Columbian anchovy could be prepared as a paste to compete in markets that are now supplied by the Mediterranean.

Smelt

There are two varieties of smelt common in the markets—the *Osmerus thaleichthys* and the *Hypomesus pretiosus*. They are both in brisk local demand.

Black Cod or Skil

(*Anoplopomidae fimbria*)

This delicious and much sought after fish abounds in the northern waters of the province, especially along the western shores of the Queen Charlotte Islands. It favours deep waters, especially depths of from seventy to ninety fathoms, though it is also found at from twenty to two hundred and fifty fathoms. It is never caught in the surface waters and avoids shallows. It is taken chiefly in the winter months. The black cod is a delicious food fish, of firm and flaky texture, being white in colour and rich in flavour. Owing to its rich, oily nature it is far more appetizing than the drier and firmer true cod. On the table it bears a distinct resemblance to a large whiting—that is, the true European whiting

—a fish wholly different from the inferior so-called whiting of the western waters. It is caught with very long lines, each carrying from twelve to one hundred and fifty hooks fixed on snoods at regular intervals. Great care has to be exercised in taking the fish off the hooks, as it is very tender mouthed.

Investigation is absolutely essential in the case of this species also. The determination of the spawning season and the nature and location of the spawn and fry are important factors in the framing of regulations to preserve and develop the industry.

Minor Varieties

A number of edible fishes abound along the rocky shores of the province, which are used chiefly to supply the local markets. The cultus cod is the principal of these minor fish ; it weighs from four to ten pounds and is caught by means of baited hooks and by drag-seines. The red cod has more the features of a bass than a cod-fish, and in California is frequently called ' sea-bass.' Its weight ranges from three to twelve pounds. Several other bass-like fishes are largely sold ; one species, generally styled the red rock cod, being a most excellent table fish.

There are no soles in British Columbian waters, the fish that is offered as such being a species of flounder. This, however, is a choice table fish. It is small, seldom exceeding a pound or so in weight.

Whales

Several species of whale are found in the North Pacific and in the Bering Sea, of which may be mentioned the sulphur-bottom (*Sibbaldius sulfurees*), the bow-head (*Balaena mysticetus*), the sharp-head finner (*Balaenoptera davidsoni*), the right whale (*Balaena japonica*), and the humpback (*Megapera versabilis*). The sulphur-bottom, which is the most common in British Columbian waters, grows to an enormous size, an average specimen weighing about sixty tons. A whale of this size should yield six tons of oil, worth $450, three

and one-half tons of body bone, $175, three and one-half tons of guano, $105, and three hundredweight of whalebone, worth $48, or a total of $778, which, after deducting expenses estimated at $206, would give a net profit of $572. A humpback, which is a smaller whale averaging about twenty-seven tons, should give a profit of $140; while a fin-back, weighing fifty tons, is credited with a gain of $338. The right whale is much more rare than any of the others named, but offers a grand prize to the hunters, for it is worth $10,000.

The Pacific Whaling Company has been operating since 1906 with great success, the average catch being six hundred whales per season. The company has adopted modern methods, and, instead of the old style of sailing ships and whale-boats, employs fast steamers, which dash alongside the whale, and dispatch it with a well-directed shot from a machine-gun. The carcass is then towed to the whaling station, where it is hauled on to a suitable stage by machinery and cut up, so that every portion of the huge mammal is utilized. This method of whaling was established first in Norway and later in Newfoundland and Quebec. The profits of whaling by this system are large, averaging from fifteen to forty per cent.

The Pacific Whaling Company has two stations on the west coast of Vancouver Island, at Sechart and Kyuquot, equipped with modern plants, and two in the Queen Charlotte Islands, at Naden Harbour and Rose Harbour. On arrival at the station the whale is raised from the water on an adjustable platform, for cutting up. Incisions are made in the carcass, running from head to tail, and about a foot apart. This divides the blubber into long narrow strips, which are then torn or stripped off by means of large hooks attached to wire ropes, which are operated by a steam winch. The blubber is then cut into small squares and put through a mincing machine, from which it goes to the steam-heated 'trying-out' tanks, where the oil is extracted. The residue of the blubber and the lean meat are converted into guano and glue. The body bones are crushed, ground, and sold for fertilizer, while the whalebone is carefully cut from the jaws, trimmed, and shipped to Dundee, Scotland, the home of the whaling industry.

Whalers operating in the Sea of Japan and Bering Sea do a considerable trade in whale meat, which is extensively used for food in Japan. Instead of converting the 'beef' into fertilizer, it is salted, and in this form commands a better price. The importation of whale meat into Japan amounts to over two million pounds annually, representing a value of over $50,000. Pickled whales' tails are esteemed a delicacy in Japan, and large quantities are shipped to that country from the British Columbian coast.

About two-thirds of the whales captured are cow-whales, either with suckling calves or with young unborn. The females, which yield more oil than the males, are broader across the body and slower in movement, and are more easily captured than the males. This, and the fact that whales are hunted at all seasons, should induce the authorities to adopt reasonable restrictive measures for the preservation of these valuable creatures. The indiscriminate slaughter of whales in the North Sea, the Atlantic and the Gulf of St Lawrence has practically destroyed the industry in those waters, and without protection the same thing is likely to result in the North Pacific.

Seals, Walruses

(*Odobaenidae*, *Otariidae*, *Phocidae*)

The fur-seal (*Callorhinus ursinus*) was formerly exceedingly abundant along the coast of British Columbia. The great breeding-ground of the fur-seals was, and is, the Pribyloff Islands, off the coast of Alaska, but a well-marked migration was noticeable in the spring and summer of each year from southern waters north along the British Columbia coast to these so-called rookeries. This seal was first made known to science by Steller in 1751, and little was known about its habits until 1869, when C. M. Scammon [1] and W. H. Dall [2] made various observations of its habits, which were followed by an exhaustive report by H. W. Elliott.[3]

[1] C. M. Scammon, *The Marine Mammals of the Northwestern Coast*, p. 141.

[2] W. H. Dall, *Alaska and Its Resources*, pp. 492-8.

[3] H. W. Elliott, *Report on the Pribyloff Group*, 1873; *Condition of Affairs in Alaska*, 1875, pp. 107-51.

Fur-seal hunting was for many years one of British Columbia's most profitable industries, but, owing to the restrictions imposed upon Canadian sealers as a result of the Bering Sea Award, and the treaty between Great Britain, Russia, Japan, and the United States (1911), under which pelagic sealing is entirely prohibited, it is a thing of the past. It is sufficient to say that such rights as Canada may have in the matter were entirely asserted through the active operations of the sealers of British Columbia. At the present time (January 1914) a commission is sitting to consider the claims to compensation of the Canadian sealers under the award made by the United States under the treaty.

The common or harbour seal (*Phoca vitulina*) is very plentiful in the inlets, bays, and estuaries of the province. Whatever economic value this seal may ultimately have, it is at present a detriment to the fisheries, as it preys largely upon the salmon and other fishes when entangled in the nets of the fishermen. Many petitions have been received by the Dominion and provincial governments from canners and fishers asking that a bounty be placed upon the hair-seal (*Zalophus californianus*) and also upon the sea-lion (*Eumetopias stellari*).

Game Fish

So far the fishes of British Columbia have been treated from an economic point of view, but from a sportsman's standpoint the field is a not less interesting one. The whole interior of both Vancouver Island and the mainland possesses a wonderful series of water communications, lakes, and rivers. These, as well as the lesser streams, are abundantly stocked with fish, principally salmon and trout. There are also whitefish in the northern waters. While the best known and favourite fishing resorts are on Vancouver Island, there is no locality where a fisherman may not prosecute with zest his time-honoured sport; and even on the sea-coast, during the salmon run, he will meet with gratifying success. The waters of Kootenay and Southern Yale are already becoming noted as fishing resorts, and when lines of communication

are opened up, the rivers and the lakes of the whole interior, affording as they do fish of uncommon size and number, will attract numerous fishermen. The scenery, too, is everywhere on a grand scale, and all natural conditions are healthful and invigorating.

British Columbia Trout

The waters of the province are rich in trout. No other section of the Dominion offers better fishing than can be found here. Of the varieties of trout found in the rivers, streams, and lakes the steelhead trout (*Salmo gairdneri*), because of its abundance, great size, and 'game' and commercial qualities, is the best known and most highly considered. From its being more or less anadromous in its habits, it is locally and in many coast sections classed with the Pacific salmon. The steelhead more closely resembles in form, colour of flesh, and habit the Atlantic salmon than any other fish found on the Pacific coast. It, like the salmon, spawns in fresh water only, but, unlike the salmon, it survives after spawning, and returns to the sea. It feeds freely at all times in either fresh or salt waters. The steelhead is of importance commercially and is commonly found in the local markets from early fall until late spring. A considerable quantity is shipped to the Eastern market in cold storage. It has a ready sale, and because of the demand for it in the fresh state the entire catch is marketed in that way. In British Columbia the steelhead averages about twelve pounds in weight, though specimens of from twenty to twenty-four pounds are not uncommon. As a 'game fish' it is considered by many fishermen to have no equal in fresh water. It readily takes a fly or spoon bait, and 'puts up a stiff fight, taxing the skill of the angler and the strength of his tackle to bring it to net or gaff.'

There are numerous species of trout to be found in the upper Fraser and Thompson Rivers, and in many of their tributary lakes, that cannot be distinguished by any technical character from the steelhead, but which, because of many differences in habits, form, and colour, have been given many

different names. Of these, perhaps the best known to anglers is the very game fish that abounds in the Kamloops, Shuswap, Okanagan, and Kootenay Lake regions, to which David Starr Jordan gave the name of Kamloops trout (*Salmo Kamloops*). The smaller specimens of this trout readily take the fly, but the larger specimens are seldom secured except by means of trolling.

In addition to the salmon and trout which abound in British Columbian waters, there are the Great Lake trout (*Cristivomer namaycush*) and the Dolly Varden trout (*Salvelinus malma*), which are easily distinguished from the true trout by their red or orange spots. These two species—which have been called charr—while abundant in most of the interior waters, are not considered of great importance to the angler, because only the young ones are taken by means of a fly. Both these fish attain a large size, the Great Lake trout not uncommonly weighing as high as thirty pounds, while the Dolly Varden often weighs from fifteen to twenty pounds.

The quinnat or spring salmon and the coho or silver salmon, despite everything that has been said to the contrary, afford splendid sport, and will readily take the fly when it is properly presented to them.

IV

THE ARTHROPODS

Lobsters

(*Homerus Americanus*)

DURING the past few years efforts have been made to establish the Atlantic lobster in Pacific coast waters, and several consignments have been imported and planted at various points. As far as can be ascertained, and from the opinions expressed by those charged with the work, there seems little doubt that this valuable crustacean will thrive in its new surroundings, and that the nucleus of an additional branch of the British Columbia fishing industry has been formed with its introduction. Great difficulty,

however, will attend the conclusive proof of the success of these experiments, as the lobster is very migratory in its habits.

In June 1905 lobsters to the number of 1025 were shipped from Halifax to Vancouver in charge of an official who was thoroughly trained in handling them. These were safely deposited at various points, but what ultimately became of them is not as yet definitely known. In the spring of 1906, 1620 more lobsters were shipped from Halifax to British Columbian waters with practically no loss. The officials looked after the planting of these lobsters with the utmost care, and in order that they might have some idea of how the crustaceans would stand the introduction into new waters, large crates were put down and the lobsters deposited in these. After some weeks they were examined and were found to be in a perfectly healthy condition. They were then distributed at different places on the coast.

Crabs

(*Cancer magister*)

Fine crabs are to be obtained in large quantities along the coast, and there is a brisk demand for them. This industry is by no means exploited to the full, however, as the Indians, by whom the bulk of the crab-fishing is done, are occupied with the salmon-fishing throughout the summer and fall. The demand for crabs in the local markets far exceeds the supply, despite the fact that they are to be found in such abundance. Saanich Arm and the lagoon at Esquimalt are teeming with crabs, and often in the summer pleasure parties go out for the express purpose of catching them. A hundred or so are often taken by these parties in a single afternoon. Some idea may be thus obtained of the numbers that are to be caught by practical fishermen.

Prawns

(*Pandalus Danae*)

As in the case of crabs, very little attention is given to the systematic capture of prawns, in spite of the constant

local demand for them. All that are offered to fish dealers are quickly bought up, for the prawns that are taken in British Columbian waters are of exceptional quality. Most of the prawn-fishing is done around Vancouver ; very little is done off Vancouver Island, though it is not because the fish do not exist there, but simply because fishermen cannot be found to undertake their capture. Nearly all the prawns sold by the fish dealers in Victoria are obtained either from Vancouver or Seattle, and it is only occasionally that local fishermen bring them in. When they do, their catch is readily taken off their hands by local dealers.

V

THE MOLLUSCS

The Oyster

THE native British Columbia species (*Ostrea lurida*) is found at points from the Alaskan boundary to the southern limits of the province. It is much smaller than the Eastern Canadian oyster and in colour and flavour greatly inferior. It has a considerable local market, and at points close to the more settled portions of the province is cultivated, notably at Boundary Bay, south of Vancouver, and at Oyster Harbour, near Ladysmith, on Vancouver Island. Good specimens reach two inches in length by an inch and a half in breadth, with a straight dorsal and a semi-circular ventral margin. It is hermaphroditic in character, unlike the eastern oyster, having no primary separation into males and females.

The Eastern Canadian oyster (*Ostrea virginica*) has been transplanted to Pacific Coast waters, and a considerable industry has arisen in transplanting spat or oysters of a year's growth from the Atlantic to the Pacific, where they are allowed to grow to maturity before marketing. The chief points where this industry is carried on are Boundary Bay and

Esquimalt Harbour. It has long been believed by practical culturists that the Atlantic oyster would not reproduce in Pacific waters.

In 1911 Dr Joseph Stafford of McGill University satisfied himself that transplanted Atlantic oysters ripened their cells in Pacific waters; that they can and do spawn, and that the eggs develop into active, free-swimming young.[1] He has not as yet recorded the discovery of any spat from these, or matured product from such spawning.

Clams

Among the many fishery resources of the province that are not appreciated at their real value is that of the clam industry. There is an unlimited market in the United States for these shell-fish, both canned and fresh. The existence of vast clam-shell beds at numerous points along the British Columbia coast—indeed, wherever Indians have established themselves—shows how much the native population relied upon the succulent food.

The clam supply in British Columbia is most remarkable; productive areas stocked with clams of various species occur practically at all points. There are several establishments for canning them located at various points in the province.

Abalone

It has long been known that the abalone occurs plentifully in certain areas along British Columbian shores, especially along the coasts of the Queen Charlotte Islands. The soft animal contents are valuable as food, while the shell itself is important for ornamental purposes. The beautiful iridescent covering of the mollusc has been always in great demand, especially by German button-makers, curiosity dealers and others. These molluscs occur at from six feet below the surface to great depths, and in the deeper waters are taken by fishermen wearing diving suits and helmets. The abalone is in much demand in China for soups.

[1] Dr Joseph Stafford, *The Canadian Oyster*, p. 126: Commission of Conservation publications, 1913.

Edible Mollusca in British Columbian Waters

The following is a list of the more important species of edible mollusca found in British Columbian waters:

Ostrea lurida	Carpenter	Native oyster
Pecten caurinus	Gould	Scallop
Pecten hastatus	Syb	Scallop
Pecten rubudus	Hinds	Scallop
Mytilus californianus	Conrad	Mussel
Mytilus edulis	Linne	Mussel
Cardium corbis	Martyn	Cockle
Saxidomus giganteus	Desh	Clam
Macoma inquinata		Clam
Macoma nasuta	Conrad	Clam
Rexithaerus secta	Conrad	Clam
Siliqua patula	Dixon	Razor clam
Schizothoerus nuttalli	Conrad	Large clam
Mya arenaria	Linne	Soft-shell clam
Paphia staminea	Conrad	Hard-shell clam
Panopaea generosa	Gould	
Penitella penita	Conrad	
Penitella ovoidea	Gould	
Zirphaea Gabbi	Tryon	
Purpuxa crispata	Chemm	Whelk
Purpuxa lima	Martyn	
Purpuxa Saxicola	Val	
Littorina sitkana	Phil	Periwinkle
Littorina scutulate	Gould	Periwinkle
Acmaea personata	Esch	
Acmaea patina	Esch	
Acmaea pelta	Esch	
Acmaea mitra	Esch	
Haliotis Kamtschatkana	Jonas	Abalone or ear-shell
Cehitone (*Cryptochiton*, *Katherina*, and others)		
Octopus punctatus	Gabb	Cuttlefish.

FOREST RESOURCES

FOREST RESOURCES

ONE of the most remarkable geographical facts concerning the Province of British Columbia is the extraordinary length of its shore-line. From Vancouver to the boundary of Alaska the coast, behind the barrier of its thousand islands, is honeycombed into one long succession of narrow, tortuous inlets, winding fiords, rocky bays and estuaries. Each inlet, in its turn, reveals itself as a network of smaller waterways whose twisted channels lead off to right and left among the impressive mountain masses that form the great Coast Range. The extent of water-front is thus prodigious. Along the whole of it, from high-tide mark to hill-top, behind the shore-side hills, up every mountain slope—everywhere, in varying shades of sombre green covering the face of nature, is the British Columbian forest, ripe with many centuries of growth, a forest whose area contains millions of acres of the finest merchantable timber—the giant timber of the Pacific Slope.

At Vancouver there is recorded an annual rainfall of some seventy inches. The farther north we go the heavier we find the precipitation, until at Knight's Inlet that region begins in which one hundred and seventy inches of rain fall each year with unvarying regularity.

In winter snow whitens the upper levels of the hills and even falls and lies for weeks in the lower woods ; but there is nothing rigorous about the wet winter weather, and, because of the mild climate and the abundant fall of rain, coniferous trees grow as they grow nowhere else upon the continent. The depth of soil covering the rock formations is often surprisingly shallow, yet scientific investigations have established the fact that the rate of tree growth in these moist

sections of the Pacific Slope is double the average rate for the whole of North America.

Add to the forests of the mainland coast the heavily timbered areas of Vancouver Island, and you have pictured an immense stand of merchantable timber that has impressed not only the imagination of many a descriptive writer, but also the precise statistical forester.

Yet barely more than half the forest wealth of the great western province is comprised within the region west of the Cascades. One-fifth of British Columbia's timber lies within that forty-mile zone, known as the Railway Belt, that stretches alongside the transcontinental line of the Canadian Pacific Railway, from Vancouver eastward to the Albertan boundary. Another great area includes the East and West Kootenays; still another lies in the triangle bounded by the railway belt, the North Thompson River, and the neighbouring province; and, finally, heavily timbered areas on either side of the route of the Grand Trunk Pacific Railway, between Fort George and Tête Jaune Cache, comprise the valuable forest of Central British Columbia. The geographical distribution of these vast bodies of timber is peculiarly fortunate —for the coast forest irresistibly invites an export trade by its extraordinary accessibility from the sea; the Kootenay and railway belt timber stands almost at the door of the great prairie market; and the central forest is so situated as to supply the coming needs of the new northern farming sections both of British Columbia and of Alberta.

I

THE TREES

SINCE Archibald Menzies first gave to the world a description of the Douglas fir, from observations made during the voyage of Captain Vancouver in 1792, botanists have taken much interest in this most valuable of softwood trees, and it has become highly prized for its quality, rapid growth, and hardiness in the reafforestation

of many areas in European countries. The wide range possessed by this conifer, extending as it does over two thousand miles from north to south, as well as the popular carelessness with tree nomenclature, is well illustrated by the number of different names, such as red fir, yellow fir, Oregon pine, red pine, red spruce and Douglas spruce, that are in use in various sections of the American West to describe the only two varieties into which the species is divided : namely, the gigantic variety produced under conditions of rapid growth in the moist climate of the Pacific coast, and the hardy but smaller tree that has been developed in the Rocky Mountain regions.

The Douglas fir was early recognized by the settlers of the West as of supreme excellence for almost every purpose for which wood is utilized. It served admirably, in the form of fuel, to supply the primitive needs of man's existence, and equally well it provided the soundest of structural timbers and the finest of clear lumber. With the growth of western lumbering this fir has been manufactured into almost every form known to the saw-mill operator, to say nothing of its use in the shape of bridge timbers, beams, mining props, railway ties, and poles. In a minor way it provides veneer for door panels, yields turpentine, fruit tree spray, shingle-stain, tar, charcoal, and pitch, when distilled ; and to a modest extent it may be utilized as pulp, though the density of the harder portion of its ' rings ' and the difficulty of bleaching make the pulp produced from it unsuitable for the finer grades of paper.

United States statistics show that the Douglas fir has grown steadily in importance as a commercial wood. Less than a billion feet of it were cut in the Western States in 1899 ; considerably over five billion feet are now cut annually ; and its value, both in the form of standing timber or ' stumpage ' and as manufactured lumber, has enormously increased. It is undoubtedly the most important of all American woods, and it is peculiarly fortunate for the Province of British Columbia that by far the greatest portion of its merchantable stand of timber consists of this valuable tree. Utilization of this great asset of the province is still in its infancy,

but the fact that the provincial cut of Douglas fir increased twenty-six per cent in 1909 and again thirty-two per cent in 1910 indicates the rapid growth of present demand and the development inevitable in the near future.

On the coast the immense sea-going canoes of various Indian tribes, each hewn from a single stupendous log, and some capable of carrying fifty men, have long been a favourite subject for the tourist's camera. In the barnlike buildings of the Indian villages in certain districts hewn planks of almost incredible length and width astonish the visitor by their size and the flawless perfection of the wood. The conifer from which canoes and planks have alike been hewn is none other than the celebrated giant red cedar of British Columbia.

The evenness of texture and the extraordinary straightness of grain possessed by this tree caused the white settler of the early days to value it for many useful purposes. Sawn into lengths and split into thin, wide sheets, it furnished him with roofing for his buildings ; he could split long planks from it with a few skilful blows of his ax ; it yielded him, with little labour, rails for his simple fences ; and for every purpose for which a wood impervious to moisture was necessary, he found the red cedar invaluable. Cedar is unaffected by dampness—it does not rot ; and in the tangled wreckage of forests that reached maturity and fell while yet the present growth was in its infancy, we find to-day, moss-encrusted but still sound at heart and valuable, the trunks of cedars that have lain in contact with surface humidity for centuries.

The lumberman, of course, has found the red cedar one of his most useful materials, no other wood bearing comparison with it for the production of shingles, while the brilliant polish that it takes renders it of great value for finishing and cabinet work. Its lightness of weight is another remarkable characteristic.

The supply of western cedar in the United States is already insufficient, and we find that, though the State of Washington —cutting over half the cedar used in the Union—sawed 184 million feet of it in 1909, trade demands necessitated the importation of two and a half million dollars' worth from Canada. A further indication of approaching shortage is the

fact that, on an average, cedar stumpage in the States more than trebled itself in value during the eight years preceding the depression of 1908.

British Columbia is the possessor of large forest areas in which the stand shows a considerable percentage of merchantable cedar, and the province already cuts four-fifths of the cedar lumber of Canada—its output being 167 million feet in 1911.

The two more important species of British Columbia conifer having been dealt with in some detail, it will be necessary merely to catalogue the other varieties that compose its forests. These are : the yellow cedar, the western white pine, white fir, yellow pine and larch, the Sitka spruce—which has so great a future before it in the manufacture of high-grade pulp upon the Pacific coast, apart from its value for boat-building, boxes, sashes and similar purposes—and the western hemlock, so long decried because of the unfortunate name that classed it with an inferior species of the eastern forests, but now coming to be recognized as a useful substitute for the Douglas fir, and as a pulpwood of no mean order.

II

A VALUABLE PROVINCIAL ASSET

BECAUSE of the excessive cheapness and consequent reckless alienation of natural resources, the early days in every new country are fraught with danger to the public interests of the community whose establishment has been begun. The federal government of the United States, through the flagrant abuse of homestead laws—designed to benefit the bona fide settler—and the Timber and Stone Act —which was intended to give him timber for his simple needs—handed over to the speculator and the 'timber baron' four-fifths of the public forests and transferred to railway companies millions and millions of acres of public lands that otherwise would have been the perpetual endowment of the Western States. The legislator of those days failed to realize

the future value of natural resources ; he gave no recognition to the value of state-ownership, and his one idea was to settle up a country quickly at any price and to shut his eyes to any abuses that this policy might encourage.

Australia, after undergoing, in a smaller way, much the same process as the United States, awoke one day to find her progress as an agricultural country restricted and confined because her fertile lands had been transferred, almost by provinces at a time, to the control of sheep-owning barons —the famous 'squatters.' By a happy chance, however, British Columbia escaped a similar misfortune. She was spared the alienation of her marvellous crown forests, because nobody recognized their value or wanted them until comparatively late in her history, when the government had already evolved a forest policy.

In the days before the building of the Canadian Pacific Railway, the forests of the province, like the water in the streams, were free for all to use. It is true that one or two of the small saw-mills of that time, desiring to secure for themselves exclusive rights over particularly convenient areas of standing timber, had obtained rights in the form of timber leases, which the government of those days had been only too willing to grant at peppercorn rentals. But when the connection was made between isolated British Columbia and the rest of Canada by the transcontinental line, new life was given to every form of local commerce, and the logging and saw-milling industries emerged from their previous insignificance. The government soon began to realize that standing timber had ceased to be valueless, and we find that in 1888 coherent legislation concerning the public forests was attempted for the first time. It was then established that crown timber was no longer to be given away ; it was to be sold at the flat rate of fifty cents a thousand feet, board measure. Owners of saw-mills, or persons who would contract to build and operate saw-mills, were allowed to obtain exclusive cutting rights over any area of forest they desired, by the payment of a holding charge of ten cents an acre annually. Hand-loggers and other small operators could obtain a licence to cut any chosen timber for a small fee.

Under this system every encouragement was given to the lumbering industry, and the cheapness of timber leases placed a certain restraint upon the indiscriminate alienation of timber-lands.

Two important principles that were introduced—the one in 1895, the other in 1896—will serve as illustrations of the various steps by which the legislature of the province gradually brought itself into line with modern statesmanship in the matter of forest policy.

In the former year the legislature decided to recognize the existence of the investor in standing timber—the man who wanted to hold timber for a rise in value, as distinct from the operating lumberman. The motive behind this enactment was of course the idea of obtaining additional revenue from the forests, and this same motive is disclosed by the fact that non-operating holders of crown stumpage were required to pay higher holding charges. The public ownership of timber-lands, as the basic principle of enlightened forest policy, was established by the act of 1896. Thereafter timber-lands of the crown were permanently withdrawn from sale; only the crop of timber upon them could be alienated by means of timber leases or cutting licences.

From time to time, in subsequent years, the terms on which crown timber could be obtained were varied in the matter of the holding charge. During the last few years of the leasing system the holding charge for non-operators was twenty-five cents an acre annually, and that for operating lumbermen fifteen cents, while considerable sums were obtained as bonus when leases were put up to competition. But it was becoming apparent to the government of the province that timber leases were not in the best interests of the community. Timber under lease was handed over to the lessee in return for an annual rental and a stumpage charge that were both fixed for twenty-one years ahead; these charges were small, and the value of timber was obviously destined to show a large appreciation in the near future. Therefore it was plain there was little chance of disposing of the timber at anything approaching its true value and that the discovery of some better method was most desirable.

At this juncture, in the year 1905, the government resolved upon a remarkable measure of policy that challenged and defeated criticism as a master-stroke of bold statesmanship. Though the lumbering industry had been progressing gradually with the growth of population in the province, its demands for many years to come could obviously be expected to make but slight impression upon the vast forests available. The hundreds of billions of feet of standing merchantable timber in the forests were remaining in the hands of the government and were unproductive of any revenue. In fact, the protection of this vast property from fire and illegal cutting threatened to impose a serious tax upon the public treasury. Moreover, the absence of revenue from the crown forests had a serious bearing upon the progress and development of the growing community. Population was flowing in and money was needed for the opening up of new districts, for road and trail building, surveys, bridges, and other expensive public works. How, then, could revenue be extracted from the forests ?

As has already been remarked, the legislation that achieved this end was of remarkable boldness : the government threw open all timber-lands. Any one who cared to stake a square mile of forest was encouraged to do so, and the exclusive right to cut timber on that area was given to him. The timber, in fact, was sold on credit, and all the government required was that interest should be paid each year on the capital value of the property conveyed. In other words, a rental was charged, and what are known as ' special timber licences ' were issued. From year to year, under this arrangement, both rental and payment on timber that is cut (royalty) may be varied in amount by the government at its discretion, and this fact brings out the remarkable feature of this novel policy : namely, that it necessitated no true alienation of the timber, the government retaining its right to share in any future rise in value. The confidence felt by the investor in this form of tenure is shown strikingly by the history of the years following 1905, for within two years 15,000 square miles, or 9,600,000 acres, of timber-lands had been taken up in this way by investors and lumbermen, while over 12,000 sales of

these valuable licences had been recorded between private parties in little over three years.

By the end of 1907 the government had secured sufficient revenue from forest sources to provide the funds necessary for provincial development, and had reached the conclusion that from every point of view sufficient timber had been placed under special licence and that it was desirable to maintain the remainder in reserve. Unforeseen contingencies might arise, timber-holding trusts might some day come into existence, whose machinations might need thwarting by the throwing—or the threat of throwing—reserve timber-lands upon a market that had been 'cornered.' For many reasons it was decided to call a halt, and a reserve was proclaimed.

As an indication of the magnitude of the forest resources of British Columbia, it is worth while recording here the change that took place in the public revenue through the eagerness of the investor to obtain cutting rights during the years 1905 to 1908. Here are the figures in question:

FOREST REVENUE OF BRITISH COLUMBIA

1901 .	$ 115,594,	being	7	per cent	of the	provincial	revenue
1905 .	486,516,	,,	17	,,	,,	,,	,,
1908 .	2,424,668,	,,	41	,,	,,	,,	,,
1910 .	2,448,150,	,,	31	,,	,,	,,	,,
1911 .	2,636,186,	,,	25	,,	,,	,,	,,
1912 .	2,753,579,	,,	25	,,	,,	,,	,,
1913 .	2,999,328.						

British Columbia thus receives more than double the amount that either Ontario or Quebec obtains from forest sources.

III

THE FORESTRY COMMISSION

IN 1901 the holders of timber leases had obtained from the legislature the right to renew their leases upon the expiration of each twenty-one-year term, subject of course to whatever conditions might be in force at the time of expiry. When timber-lands to the vast extent of 9,600,000

acres had been taken up under licence between 1905 and 1908, there arose an agitation among the licence-holders for a similar privilege of unlimited tenure, for, so far, their licences had merely secured them cutting rights during a period of twenty-one years. It was at this juncture that the government decided that the complicated nature of the situation with respect to the tenure of crown timber-lands and the necessity of putting into practice the new doctrine of conservation as applied to forest resources demanded the appointment of a special board of investigation, and it therefore appointed—in July 1909—the Timber and Forestry Commission, composed of the Hon. Fred. J. Fulton, then chief commissioner of Lands, A. S. Goodeve, M.P. for Rossland in the Dominion House, and the present writer.

The commissioners began their labours by making a tour of the province and holding sittings in all the chief centres of lumbering activity, thus eliciting a great deal of evidence from lumbermen, timber owners, and the public generally. They journeyed to Toronto and Ottawa for the purpose of studying the progress made in forest administration by the Dominion and Ontario governments; and by visits to conservation congresses and to Washington, D.C., they were enabled to obtain from the Hon. Gifford Pinchot and other prominent officials an effective idea of the up-to-date methods of forest policy and organization developed of recent years in the United States. After having studied the whole subject for eighteen months the commissioners presented their report to the government towards the end of 1910.

One of the first questions submitted for the commissioners' consideration was the desirability of extending the period under which timber could be held by licensees, and after mature consideration of all the complex bearings of the matter they had no hesitation in endorsing the proposed abolition of any arbitrary time-limit, being led to this opinion by the fact that the forest would receive the best treatment at the hands of licensees who were not obliged to cut the timber off hurriedly within a fixed time, regardless of market conditions; also, increased security of tenure would be of the greatest assistance to licensees in the financing of their

holdings, and would therefore promote the welfare of the important lumbering industry. The time-limit was therefore abolished.

The next pressing matter dealt with by the commission was the protection of the forests of the province from fire, a matter that had not yet received the serious attention that it deserved in the American and Canadian West. Owing to the small amount of rain that falls in the summer, the forest floor in many regions of the Rocky Mountains and the Pacific Slope becomes tinder-dry for several months. With the settlement of the country the danger from fire has been constantly increasing. The public, accustomed to regard forest fires as a natural phenomenon, has been extremely and even cynically careless. Year after year, railway locomotives passing by valuable areas of timber have showered sparks into inflammable material allowed, in direct violation of the forgotten law, to accumulate upon the rights-of-way; farmers, with the sole idea of clearing land in the cheapest, easiest way, have fired their slashings at the height of the hot season, in absolute neglect of the safety of adjoining forest; campers, prospectors, hunters have given no second thought to the fires they left to spread and devastate perhaps a whole watershed; and even the lumbermen, whose self-interest might have been supposed sufficient to safeguard the neighbourhood of their operations, have used fire, explosives, and spark-emitting donkey-engines without the slightest precautions of common sense.

The inevitable result was seen year after year in the appalling destruction of forest property. Conflagrations raged unchecked unless they threatened settlements; blackened wastes replaced hundreds of thousands of acres of the finest merchantable timber, and in many regions of the province investments in standing timber were merely a gamble against the fire hazard. A most striking example of the results of fatalistic negligence occurred at Fernie, when a fire that had been burning for many days near the town and that had been neglected was fanned by a sudden windstorm into a cyclone of flame that obliterated the town and caused the loss of many lives.

In other portions of the continent—in Ontario and Idaho, and especially in the national forests of the United States —it was being demonstrated that a moderate expenditure of money upon the maintenance of a force of patrol-men, combined with a campaign for the education of the careless public, was a most effective preventive of forest fires. In Idaho the lumbermen banded themselves together in associations, secured the passage of what was then considered a drastic law, and handled the whole question of forest protection themselves. They showed most effectively that, at an average cost of about two and a half cents an acre, they could reduce the annual destruction by fire to a negligible amount. The association movement spread to Washington, then to Oregon, and is now stirring timber owners in other Western States to action.

In British Columbia the different ideas of governmental activity that exist under the British flag caused the lumbermen to look to the authorities for protection of their timber, and even before the appointment of the Forestry Commission the provincial administration had already begun in a tentative way the establishment of a fire-patrol organization. Through the efforts of the commissioners the active interest of the government was enlisted in the good cause, and the preventative service in consequence began the season of 1910 supported by a vote of $75,000. That was but the first step, however. Nature herself intervened, and in the presence of the disastrous series of conflagrations that marked that fatal summer the government doubled its force of fire-wardens and quadrupled its expenditure upon fire-fighting. In 1911 the number of wardens was again doubled, and by the employment of divisional inspectors and supervisors a much higher degree of organization was obtained. The numerous gangs of workmen employed on government roads, in every district of the province, are all subject to the call of any warden, and in this manner the nucleus of an effective fire-fighting crew can always be obtained at comparatively short notice. The work hitherto maintained by the government has been intentionally of an emergency nature, for both government and lumbermen realize that it is fitting

that owners of standing timber should contribute towards the expense of forest protection service.

The commissioners recommended that the cost of fire prevention throughout the province should be shared equally between the holders of timber-lands and the provincial treasury, and the suggestion was accepted by the government and embodied in the Forest Act of 1912. Under this act a Trust Deposit Fund is created by equal contributions from these two sources, one cent an acre being levied annually on all timber-lands. The levy may be increased or diminished from year to year as circumstances require.[1] The fund is under the control of the provincial Forest board and provides not only for the upkeep of a large patrol force, but also for the construction of permanent improvements designed to increase the efficiency of this force. The experience of the voluntary associations in the Western States and, in a still greater degree, the results achieved on the national forests, bear striking witness to the value of field telephone systems, of look-out stations on high elevations, and of the systematic cutting-out of trails and fire-lines. The field telephone, in particular, has been brought to a high pitch of usefulness by electrical firms acting in conjunction with the officers of the forest service. Permanent lines are strung through the woods and their upkeep attended to by neighbouring ranchers in return for permission to use the system themselves; so that at a comparatively small cost the patrol-man who discovers a fire while making his rounds is provided with the means of summoning assistance without delay. Camps of fire-fighters in remote localities are also kept in touch with headquarters by the laying of light wire along the ground, a method that in dry weather is effective up to ten or twelve miles. These details are given to show how vastly more effective the employment of up-to-date methods can make the ordinary patrol-man, for prompt arrival and quick communication with the base from which supplies and men must be obtained is the secret of successful fire-fighting.

Governments, foresters, enthusiasts of the conservation movement, and even, of late years, the larger timber owners

[1] This levy is now (1914) 1½ cents per acre.

of this continent, have begun to realize that the old fatalistic attitude in the face of forest destruction was unwarranted and stupid. It used to be the general belief that when the merchantable timber in any forest area had been cut, that area could be regarded as finished and done with for all practical purposes, for the slash and inflammable débris created by the cutting operations would inevitably catch fire sooner or later, kill the young growth, and so make reproduction within the next century an extremely doubtful matter. The creation of this fire hazard was regarded as an inevitable feature of all logging, since it was held that the disposal of the slash in the interests of the forest was too costly an operation for any lumberman to attempt. It is obvious that the continuance of this reckless policy would in time remove the continent of North America from the short and insufficient list of the important timber-producing regions of the world. One by one, however, American and Canadian governments have begun to face the thorny question of reform, and to make the first half-hearted attempts to save some fragment of forest wealth for the coming generations.

Courageous and vigorous action has been taken by only three of these governments. In the comparatively easy matter of timber sales in the national forests, the federal government of Canada insists that all logging débris shall be disposed of by the operator; in Minnesota lumbermen are required to carry out the regulations of the State forester in this respect ; while in British Columbia, where the heavy stand of timber and dense undergrowth would render the cost in many districts prohibitive to the lumbermen, the government—in a true spirit of statesmanship—has undertaken to dispose of logging débris through the medium of the Forest Protection Fund, to which, as already stated, both government and timber owners contribute equally.

The upshot of the matter is that, by the creation of the Forest Protection Fund—which can be automatically increased beyond the annual quarter of a million dollars, provided by the first levy, to any amount found necessary for a thorough-going policy of fire protection—the timber-lands

in British Columbia will henceforward be given a protection that no other forests of the world—except those of certain highly developed European countries—receive. The vast accumulations of débris that already exist in the province will be dealt with through the fund ; the creation of fresh dangerous areas will be prevented ; and backed by a law that provides for the condemnation of fire-traps as public nuisances, for the clearing up of all rights-of-way, trails and roads, and for other precautions too numerous to mention here, the general abatement of dangerous conditions throughout the province will be vigorously undertaken. The effect both upon standing timber in British Columbia and upon the lumbering industry will be considerable, for no factor has hitherto had so powerful an influence in depressing the value of western stumpage and in rendering difficult the financing of saw-mill enterprises as the investor's fear of the fire hazard. In this respect the investments in British Columbian timber will henceforward be classed as 'gilt-edged.'

Having devoted sufficient attention to the pressing matter of fire protection, the commissioners proceeded to consider the many other problems submitted to their consideration. The studies that were made of the experiences of other provinces and states, however, soon forced upon their attention one main outstanding fact, namely, that excellent in theory as the forest policies of governments have sometimes been on this continent, and poor as they generally are, the damning feature of nearly every one of these policies, good and bad alike, has been the apathy shown by legislatures in providing means for effective administration.

Even the admirable Forest Service in charge of the United States national forests was for long starved into impotence by Congress, and many a State government has supported a well-meaning Forestry board by a grant insufficient to pay their postage bill. The conservation movement of recent years has at least achieved this result—that governments are beginning to recognize that the forests of this continent are doomed unless large sums of money are spent on them, and that expert advice and the organization of competent forest services, composed of men of an efficient and trust-

worthy stamp, are essential for the proper expenditure of this money.

Congress now votes nearly six million dollars a year for the administration of the 170 million acres of national forests, and with this example before it the commission recommended that the government of the province should regard the royalty that is received by the treasury upon the cutting and removal of timber from the crown forests as forest capital, so that as much of this royalty as should or could be profitably reinvested in the maintenance or improvement of the forests should be retained for that purpose. The commission was of the opinion that it was as improper to withdraw capital from the forest business of the province as it would be to impoverish any commercial undertaking by a similar proceeding.

No better way of reinvesting royalty in forest property could be devised than the creation of the best expert forest service that the province could obtain, and the commission recommended that the continent should be ransacked in order to discover and secure the best men available. There was a general chorus of sincere approval throughout British Columbia when the government announced—in introducing the Forest Bill—that Gifford Pinchot had taken the greatest interest in the quest for good men, and that the services of Overton W. Price, vice-president of the National Conservation Association, the man who, under Pinchot, had achieved the splendid organization of the United States Forest Service, had been secured as consultant forester.

Pinchot's interest is such that he proposes to give the work of forest investigation in the province his personal supervision as far as his other duties will permit.

Under such auspices and with such determination to provide the province with the best forest service that money and thought and careful work can provide, the prospects of forest conservation in British Columbia are extremely bright. Devastation has so far barely eaten up the fringe of the great forest areas, and with the control of logging operations and the work of reafforestation placed in strong, capable hands, the use of the forests will cease to be synonymous with destruction and abuse.

The expenditure of the fiscal year 1913-14 is as follows:

General administration	$245,754
Forest protection	286,055
Total	$531,809

The income of the Forest Protection Fund is as follows:

Timber holders and owners	$166,113
Government	166,113
Refunds from railways	18,456
Total	$350,682

The forest revenue, as shown in the public accounts for the years 1912 and 1913, is composed as follows:

	Twelve Months to December 1913	Twelve Months to December 1912
Licence rentals	$2,115,474	$1,937,194
Royalty and tax	492,649	489,377
Lease rentals	119,291	79,262
Scaling fees	25,738	36,833
Licence penalties	24,291	25,651
Timber bonus	18,720	...
Transfer fees	10,385	11,440
Hand-loggers' licences	5,025	4,125
Miscellaneous	21,215	19,237
	$2,832,788	$2,603,119
Taxation from crown grant timber-lands	166,540	150,460
Totals	$2,999,328	$2,753,579

IV

TIMBER AREAS

In Private Ownership

AS has been mentioned in the preceding remarks, timber-lands—previous to the year 1888—were sold like any other lands, no value being placed upon the timber. For eight years subsequent to that date sales continued to be made, but any timber cut from the lands sold was

subject to the payment of fifty cents per thousand feet royalty. Timber-lands were also included in various railway grants as late as 1901.

Wild—that is to say unimproved—lands in British Columbia are subject to an annual tax of four per cent on their assessed value, the tax being designed to prevent the locking-up of large areas for investment purposes and to compel utilization. Recognizing that so heavy a tax would encourage tree-slaughter and be contrary to the true principles of conservation were it applied to timber-lands in private ownership, the government permits all bona fide holdings of standing timber to be taxed at half the wild-land rate, namely two per cent. At the time of writing (1913) the classification of the six million acres granted to the five subsidiary companies of the Canadian Pacific Railway in the southern interior of the province is still incomplete, owing to the many delays incident to the prolonged litigation—only brought to a conclusion of recent years—with these companies; and it is therefore impossible as yet to say what area included in these six million acres is covered with stands of merchantable timber.[1] There are, however, over 800,000 acres of private timber-lands subject to taxation and a further 375,000 acres free of taxation still unsold in the possession of the Esquimalt and Nanaimo Railway Company on Vancouver Island.

Leasehold Timber-lands

Some few leases were granted at a rental of five cents an acre by authority of the lieutenant-governor in council before the legislature made formal provision for this form of tenure in the act of 1888. After that date timber leases continued to be granted at various rentals, varying from ten to twenty-five cents per acre, and for periods ranging from fifteen to thirty years, until the abolition of the leasing system in 1905. We find, therefore, that in 1912 timber leases covering 613,000 acres were in existence.

[1] Repurchase of the bulk of these lands by the government has now (January 1914) been completed, and examination of their timber value is being conducted by the Forest branch.

In 1901, and again in 1908, the legislature offered to give the right of perpetual renewal, in consecutive periods of twenty-one years, to all leases that were surrendered by holders within a year from the date of the enactments, and a large number of lessees took advantage of this privilege. We find, therefore, that of the leases now in existence those covering a total of 386,458 acres possess the right of renewal, while the balance will lapse and determine upon the expiration of their original periods. Any lease entering upon a renewal term does so upon the conditions ruling at the time of renewal, the idea of the legislature being to secure to the crown, from time to time, a fair share of the appreciation in value of the timber held under this form of tenure.

In connection with timber leaseholds, mention should be made of 354,399 acres leased to four companies, under an act passed in 1901 but which was repealed shortly after, for the purpose of encouraging the establishment of the pulp and paper industry in the province. These pulp leases were issued for twenty-one years at the nominal rental of two cents an acre. Although the legislature intended merely to provide supplies for pulp and paper mills, it was inevitable that a considerable stand of the choicest merchantable timber should be included in the areas demised, and the absence of any provision for the cutting of this merchantable timber has caused the present government considerable difficulty in dealing with the matter, several of the pulp companies having equipped large saw-mills to operate upon the timber in question. So far, the only solution attempted has been to require these companies to take out special licences covering any areas from which they may desire to cut merchantable timber.

Some 32,252 acres have also been leased upon similar terms to a tanning company, for the purpose of stripping hemlock bark.

Licensed Timber-lands

By far the most important holdings of timber in the province are, however, the areas taken up under special licences during the three years 1905-6-7, when the crown forests were thrown open to staking—no less than 8600

square miles of timber-land being held under this form of tenure in the regions west of the Cascade Mountains, and 6400 square miles east thereof. The annual rental or fee charged for the renewal of the holder's option on this licensed timber is subject to change from year to year in order that the crown may participate in the holding profit or increase in value of the standing timber, but so far (1913) it has not varied from the original amounts imposed, namely, $140 per square mile on the coast and $115 per square mile in the interior.

These holding charges, which work out at less than twenty-two cents and eighteen cents per acre, are thus very reasonable, varying from less than one cent to less than three cents per thousand feet per annum, in accordance with the density of the stand. Upon payment of the holding charge and upon compliance with the government's regulations a special timber licence may be renewed annually as long as merchantable material remains upon the land it covers, provided the holder has taken care to claim this privilege in accordance with the provisions of the statutes.

Timber-lands hitherto Reserved

At the end of 1907 the government decided to stop the issue of fresh licences and to place the remaining crown timber-lands under reserve until such time as it had come to a decision concerning their disposal. The Forest Bill of 1912 provided for timber sales. Any stand of timber that it was considered desirable in the public interest to sell was to be examined, cruised, and surveyed by the Forest Service, and after due advertisement the licence covering the sale area was to be sold to the highest bidder. Bids were to be made either in the form of cash-down bonus covering the whole berth, or on the improved Ontario system of bonus per thousand feet of timber payable, in addition to the ordinary royalty, at the time the timber was cut.

Circumstances may make one or other method preferable in any particular case, but in general the bonus per thousand feet clearly gives the better results to both government and

purchaser, since the government gets paid for all the timber sold while relieving the purchaser from the fire risk—no bonus being taken from the latter's pocket except for timber that he actually cuts.

Concerning the area, stand, and general valuation of the timber at present held in reserve there are the most varied opinions even among those most familiar with the many districts of the province in which the scattered areas of this reserve exist. The chief of the difficulties that at present precludes any authoritative statement upon the subject is the fact that only a small proportion of the timber taken up under special licence during the furious activity of 1905-6-7 has as yet been surveyed. In August 1910 only 1500 of the 15,000 licences had been definitely located on the map, and though surveyors were busily at work during 1911, the government found it necessary to extend the time-limit—within which survey is to be compulsory—to 1918. It is hoped, however, that, by bringing pressure to bear on dilatory licensees and by surveys made by the government itself, the boundaries of the reserve timber will be definitely ascertained some years before that date.

Meanwhile, therefore, it is necessary to rely upon the analysis of a vast number of opinions expressed by experienced men, each of whom has spoken with familiarity of conditions in districts known to him, and to hazard, in consequence, a general impression that the reserve timber-lands comprise about one-quarter of the total forest area under provincial jurisdiction.

Railway Belt Timber-land

The belt, forty miles wide, that stretches across the province alongside the main line of the Canadian Pacific Railway was transferred, at the time of Confederation, to the jurisdiction of the Dominion government. Somewhat over one and a quarter million acres of the timber-lands in this railway belt are now held under licence upon terms that are essentially different from those of the provincial licence tenure, Dominion timber licences being sold by auction and the holding value of the timber being realized by way of bonus at the

time of sale instead of by annual rental as in the provincial licence. A nominal rental of five dollars a square mile east of Yale and five cents an acre west of that point is alone imposed. Royalty on timber cut is fifty cents per thousand feet.

According to the estimate of the Dominion forester, about half the available timber in the railway belt remains still unalienated in the hands of the federal government. The total stand within the belt is held to be between forty and fifty billion feet.

Total of British Columbia Timber

Summarizing the above discussion, we may estimate the acreage of timber-lands and the total stand of merchantable timber within the whole province to be composed as follows :

	Acreage	Av. Stand per acre ft. B.M.	Total Stand ft. B.M.
Vancouver Island crown grant timber .	344,000	35,000	12,000,000,000
Mainland crown grant timber .	484,000	10,000	5,000,000,000
E. & N. Ry. Co. .	350,000	14,500	5,000,000,000
C. P. R. (unpublished conjecture) . .	822,000	..	6,000,000,000
Timber leaseholds .	613,000	26,000	16,000,000,000
Special licence timber	9,000,000	12,000	108,000,000,000
Mill timber on pulp leaseholds . .	387,000	13,000	5,000,000,000
	12,000,000	..	157,000,000,000
Reserve timber-land, conjectured to be ¼ total forest area under provincial jurisdiction, say roughly	4,000,000	12,000	48,000,000,000
	16,000,000	..	205,000,000,000

To this must be added the forty or fifty billion feet of the railway belt, giving a grand total—for the whole province—

of say 250 billion feet. The gradual lowering of the standard of what is known as merchantable timber will probably increase this amount to the three hundred billion feet that finds favour with Dr Fernow and other foresters as a reasonable estimate of the forest wealth of British Columbia.

The United States is usually credited with 2500 billion feet of standing merchantable timber, Canada with about one-fifth of that amount. Over half the stand of the United States is in the Rocky Mountain and Pacific forests, and considerably over half the Canadian stand is in the Province of British Columbia. Comparison of the populations and habitable areas of the two North American powers shows very clearly that Canada is, and will always be, far richer, proportionately, as a forest country than the United States. In fact the latter country is already discovering that within another thirty years a very serious situation will arise within its borders owing to the reckless overcutting that is at present inevitable, and her export trade in lumber is doomed within the lifetime of the present generation. British Columbia is in a far different position, and is destined—like Sweden and Russia—to be an exporting country for as long as our powers of prediction can foretell. In the remarkable climate of the section of the Pacific Slope that the province possesses, nature provides the forests with a recuperative power far greater than that of other forest regions ; and the well-known fact should never be lost sight of, in any estimate of the potentialities of our forest wealth, that the rate of tree growth on the British Columbia coast is twice the average for the continent.

V

THE SAW-MILLING INDUSTRY

OF recent years a marked tendency has been observable among the holders of crown grant leasehold and licensed timber-lands alike to amalgamate their holdings, and both the general press and the lumber trade journals have recorded a large number of important mergers. As

a result of this movement, the financial journals of North America and of England have devoted considerable attention to the valuable nature of stands of timber in British Columbia, and a great many large-scale flotations have been successfully placed on the market. Capital has thus become interested in lumbering operations in the province in amounts ranging from ten million dollar issues down, and the stimulus received by the lumbering industry has already produced visible results in the erection of new mills, some of them both in size and up-to-date equipment being among the finest in the world. Though many of the heaviest stands of timber are so accessible from tide-water that they may be logged with the simple equipment of yarders and road donkeys, yet the larger companies have prepared for the development of their enormous holdings by heavy expenditure upon logging railways.

Other improvements are under way in the gradual replacement of coal and wood burning engines by oil burners to eliminate the danger of fire, and the utilization of electrical energy in woods operations has passed the experimental stage, though of course the large initial outlay required will always restrict its use to operations on a very extensive scale. All over the Pacific Slope immense stands of merchantable timber occur on slopes too steep for profitable logging by ordinary methods, and considerable attention has been directed to the invention of overhead or 'sky-line' systems of haulage, by means of which logs can be cheaply conveyed down gradients of any steepness. Several of the systems are now being installed in the province, and there is no doubt whatever that in many sections sky-line systems will oust other methods by reducing logging costs to a minimum.

Owing to congestion of work caused by general increase in lumbering activity, the Forest branch of the department of Lands has fallen somewhat behind in the collection of statistics, and it is therefore impossible to give many details concerning the lumbering industry that would have been of interest. There are approximately 270 mills in the province, fifty-nine of them being devoted to the production of shingles.

The statistics of the Manufacturers' Association are as follows:

	1909	1910	1911	1912
Lumber cut:	million ft.	million ft.	million ft.	million ft.
Coast mfrs.	537	600	739	902
Mountain mfrs.	330	428	450	360
	867	1028	1189	1262
Shipments by rail:				
Coast mfrs.	209	263	340	472
Mountain mfrs.	325	377	420	440
	534	640	760	912

The coast manufacturers sell about 250 million feet a year locally and ship about 70 million feet by sea to foreign countries. In addition to these amounts, some 47 million feet of logs are exported to mills on Puget Sound from lands that do not come under the stringent provisions of the Timber Manufacture Act, which prohibits the export of logs from crown timber-lands.

Taking the whole province and including, therefore, the Dominion railway belt, the statistics collected by the Forestry branch at Ottawa show that British Columbia captured from Quebec the second place among the lumber-producing provinces of Canada in 1909; while in 1910 the value of her cut was double that of Quebec, and its quantity—no less than 1620 million feet—was practically equal to the cut of Ontario. It is obvious, therefore, that Ontario is on the point of losing for ever her old-time supremacy; and yet the remarkable fact is that British Columbia has practically only begun the exploitation of her forest wealth.

That the exhaustion of the East and the consequent westward shifting of the source of timber supply for the North American continent is already imminent, and that nevertheless the lumbering industry of British Columbia is but in its infancy, may be seen very clearly by comparison with the Western States. The State of Washington, with little more

timber than British Columbia, has become the foremost lumber producer of the Union; and Oregon, with much the same stand, has already shot up to the fourth place on the list. The annual cut in the United States is about forty billion feet, and statistics for 1910 show the following items:

	Lumber cut: million ft.
Washington	4097
Oregon	2085
California	1255
Idaho	746
Montana	319
	8502

As against these totals, British Columbia has only been cutting from 1000 to 1600 million, and we can see how favourably the province is situated from the fact that the total cut of Canada, many of whose eastern regions have already passed their zenith as producers, is less than the combined cut of the first two of the Western States on the list just given.

A serious feature in the situation of late years has been the chronic over-production of inferior grades of lumber in some of the Western States. The market for this is limited at present, and to get rid of their surplus stock at any price the American manufacturers have been disorganizing the prairie markets by dumping into them shipments at sacrifice rates. The recent more rigorous enforcement of the customs regulations has, however, given a much needed protection to the British Columbian manufacturer, and it is no longer possible for firms south of the international boundary to evade the payment of duty by artificially roughening the dutiable grades of imported lumber.

VI

THE PULP INDUSTRY

IN dealing with the various tenures under which timber-lands are held in the province, mention has already been made of the 354,399 acres that were leased to four pulp companies under agreements made in 1901. The leases were for twenty-one years at the nominal rental of two cents an acre, the legislature being desirous of giving every possible encouragement to the establishment of the pulp and paper industry. The four concessions are as follows :

	Acres
Powell River Company . . .	134,551
Ocean Falls ,, . . .	79,999
Swanson Bay ,, . . .	84,180
B. C. Wood Pulp and Paper Co. .	55,669

It became apparent, however, in the years following 1901, that the time was not then ripe for the establishment of the new industry, and the companies holding these concessions were for long unable to finance their enterprises and complete the erection of their mills. With the coming of good times, however, after the great depression of 1907-8, investors began to realize the value of the immense stands of first-class pulp-wood in the possession of these British Columbian concerns, and no further difficulty was found in securing the necessary capital. At the time of writing (1913) three large plants have been equipped for operation in connection with the original concessions, while a fourth plant is in process of reconstruction. Moreover, a new mill on Howe Sound has been built without the aid of any grant of timber-lands from the government, and is now operating.

The plant of the Powell River Company is pronounced by experts to be the most perfect one of its kind upon the

continent. Its present output capacity is 225 tons of newsprint paper a day, and so pleased are its owners with the prospects of western trade that preparations are being made for doubling its capacity. The plant itself, to date, has cost $3,000,000, and the total investment of the company is in excess of $5,400,000. Apart from the purely commercial side of the undertaking, a particularly pleasing and politically important feature of it is that with a monthly pay-roll of $100,000 and a force of some 1200 men—every one of whom is a white man—a new settlement is being created upon a hitherto sparsely populated section of the coast, and a new bulwark against the oriental invasion is established. The operation of the plant, moreover, marks a step forward in practical forest conservation, for not only is the company operating largely on inferior species, such as hemlock and balsam, and thus making a clean cut in its operations in the crown forests, but also, by combining the logging of merchantable timber with the cutting of pulpwood, the appalling waste that is the inevitable feature of most western logging operations at the present stage of development is very considerably reduced.

The investments made by the other pulp companies of the province are also considerable. At Ocean Falls over $1,500,000 has been expended upon a combined saw-mill and mechanical pulp-mill, the saw-mill waste being utilized for pulp as well as the inferior logs in the booms. At Swanson Bay over $1,000,000 is represented by another combination of saw-mill and sulphite pulp-mill; while the soda pulp-mill of the British Columbia Pulp and Paper Company at Port Mellon has cost in the neighbourhood of $400,000. Plans are now being drawn up for the building of a new mill in connection with the limits at Quatsino. On Howe Sound is the recently opened mill, which has cost to date (1913) in the neighbourhood of $600,000. This mill manufactures sulphite pulp.

We have thus a total of $6,500,000 expended in the province within the last three or four years upon pulp and paper mill construction alone. In Washington and Oregon there are already six mills in operation, three of them being in

the neighbourhood of Oregon City; but British Columbia occupies a strong strategical position, as compared with all possible competition on the Pacific Slope, on account of the valuable water-powers that she possesses, and in view of the fact that cheap power is a factor of the highest importance in the development of the newsprint industry. China, Japan, and the Orient generally, Australia and South America offer most promising markets for an export trade in both pulp and manufactured paper, and though the selling range of coast companies will be limited by freight rates to the western portion of the continent, the influx of population to the Rocky Mountain and coast regions is providing a considerable and constantly increasing market.

VII

THE PANAMA CANAL AND THE LUMBER TRADE

SINCE we have arrived within a year of the opening of the stupendous canal that is cutting in half the land surface of the western hemisphere, it is natural that the probable effects of that canal upon the world's commerce should already be the subject of lively discussion. Pessimists there have been who claimed that the enormous cost of construction—four hundred million dollars or thereabouts—would compel the American government to levy tolls so high that the commercial advantage of the new route over the long sea passage would be nullified in the case of bulky products such as lumber. As time has progressed and discussion has cleared the air, it has, however, been becoming plainer and plainer that the high-toll principle cannot possibly be adopted by the American government. Doubtless the protection of their own mercantile marine—in so far as that marine may survive the steady process of decay that has already reduced it to comparative insignificance—will keep alive the agitation in the States for discrimination in favour of American vessels; but it is ludicrous to suppose that any attempt will be made to exact tolls on foreign shipping that would discourage vessels from making the short cut by Panama. The American

people, intentionally or unintentionally, have spent three hundreds of millions upon a great work for the general benefit of mankind. It is extremely doubtful whether the canal can be made to pay—as a mere commercial undertaking; and there is certainly no hope of putting it on a paying basis unless a large tonnage be handled steadily. With high tolls the tonnage could not be obtained, for a very considerable proportion of the available commerce will consist of lumber and wheat from the Pacific coast and the western prairie regions, and other commodities that must be handled cheaply.

We may draw a reasonable inference also from the actions of the great federated transcontinental railways of the States. For years they sought to discourage the Panama idea, and by their control of shipping on the Pacific coast they contrived to starve the development of trade via Tehuantepec and Panama. Subsequently they were the prime movers in a campaign directed against the canal proposal itself, and more recently the alarmist rumours concerning the high tolls that have been put forward as a necessary feature of the canal have evidently been set on foot by them. The great railway interests have, however, been forced to accept the inevitable, and—as is evidenced by their heavy expenditure upon the improvement of Western terminal facilities—they are now joining with zeal in the vast work of preparation that is in busy progress in all the ports of the Pacific coast, from Prince Rupert in the north to San Diego in the south.

The following table of distances illustrates forcibly the advantageous effect upon the West of the opening of the canal:

Port of Victoria, B.C., to Plymouth, England:	
By the Cape of Good Hope . .	18,780 miles
,, ,, Suez Canal	15,560 ,,
,, Cape Horn	15,180 ,,
,, the Panama Canal . . .	8,560 ,,

The distances from British Columbia ports to Europe will therefore be halved by the new Panama route and a saving effected of from seventeen to twenty-three days in the case of steamers.

THE WHARF AT PRINCE RUPERT, 1909

The opening of the canal will change many currents of the world's commerce, and its most powerful effect will be felt upon the hitherto somewhat isolated Pacific coast. Upon no industry will this effect of the canal be more pronounced than on the lumbering industry. Lumber—except in its highest grades—is a product whose transport to any considerable distance is only commercially feasible when low freight rates exist; in fact, the freight rate is all-important. It is owing to this fact that logging operations in the Pacific North-West have entailed—and continue to entail at the present day—much appalling waste of what will in the near future be considered valuable wood. The present crop of timber is being picked over and 'culled' rather than harvested, and yet, in spite of this initial waste in the woods themselves, the lumber yards of western mills are glutted with the residue of sales—the inferior grades of rough lumber which the local market cannot absorb and which cannot be shipped to distant points because their low value will not support high freight rates. This era of waste—waste doubly pitiful in view of the timber shortage that will grip the world before the end of the present half-century—can only be terminated in one of two ways: either by the rise in value of all timber, which will automatically cause waste to cease, or by the opening up of new markets that can be reached at low transportation rates.

Western lumbermen realize that the Panama Canal will provide these rates, and put an end to enforced destruction of good material upon the scrap-heap and the incinerator. At present the freight rate on fir from coast to coast is $24 or $25 a thousand feet board measure, or roughly, twice the price at which the product sells at the place of production. Cut off as it is, in this way, from the big markets of the Atlantic, the lumbering industry of the Pacific coast finds its expansion clogged and hindered by chronic over-production.

The rich future before the industry has attracted enormous investments, and impatience to realize on these has created a mill capacity in every western forest region that is far in excess of the existing demand. Only by mutual agreements to limit output can any stability be given to trade

conditions; and this unsatisfactory state of affairs—so galling to enterprising Westerners—can only be removed by the completion of the stupendous work at Panama.

It is as yet impossible to put into dollars and cents the exact effect that the opening of the great canal will have upon freight rates, but this may be said, that even in 1911, with all the expenses incident to the handling and rehandling of lumber when breaking bulk, shipments of fir lumber were made from Portland, Ore., to New York City, via the Isthmus railway, at little over half the transcontinental freight rate by rail. One beneficial effect of the canal, therefore, will be the providing of an outlet for the over-production of Washington and Oregon saw-mills, for the operators in these States will be no longer under compulsion to dump their surplus stocks, in times of depression, into the Canadian prairie market. Of late years the necessity of raising a little ready money at any sacrifice has caused these operators to demoralize the lumber market in Western Canada by selling the lower grades of lumber at a loss, no less than 114,000,000 feet having been sent across the line in 1910 and 264,000,000 feet in 1911; and we have seen the distressing spectacle of a transcontinental and government-assisted railway under construction ignoring the saw-mills of the forest province in which its line was being built and buying its materials abroad. The more stringent enforcement of the customs regulations under instructions from the government at Ottawa has done something to check this undesirable state of affairs, but only Panama can effect a permanent cure.

VIII

THE FORESTS AND THE FUTURE

THERE is peculiar force in the dictum that even in private hands forest wealth is community wealth; for it is calculated that four-fifths of the value of manufactured lumber represents the wages of labour, and in consequence circulates through every artery of commerce. Lumber, moreover, in British Columbia is the chief of the

products that bring in and earn outside money, and we have seen that this already means approximately $25,000,000 a year to the province even now, while the cutting of the present crop will yield a total of four and a half billion dollars, without taking the least account of the inevitable rise in value that will take place while that cutting is being carried on. In addition to all the reasons mentioned, it is because nine-tenths of the provincial forests have been carefully retained as crown property that they have their enormous importance for the people of British Columbia, and it is because of this happy fact again that the government has been led to pay such attention to the checking of fire losses and to recognize that fire protection on a very large scale is one of the best investments that it can make—hence the big campaign that the government has now commenced through the agency of the Forest Protection Fund.

Fire protection, however, is but a preliminary—though an essential one—to the great work of conservation. It must be recognized that at least as great a campaign is required in the interests of practical reafforestation.

Experts of the United States Forest Service, basing their calculations upon studies made on the rate of growth of timber on the Pacific coast, have demonstrated that it is possible, even now, to grow Douglas fir from seed at a commercial profit. One at least of the large lumbering concerns of Oregon is reafforesting its cut-over lands as a business matter and employing trained foresters for the purpose. Others will soon be following this example. In the case of that great holder of Western stumpage—the British Columbia government—reafforestation on a very large scale will be recognized as a function of the state, just as it is in the national forests of the neighbouring Republic.

Some very reliable figures are available in the case of Douglas fir. Assuming that the standard of what is merchantable will, as years go on and the fast-diminishing supply of the world's timber becomes more valuable, permit of the utilization of trees twelve inches in diameter at breast-high and of logs as small as eight inches in diameter, the measurement of the United States Forest Service shows that an

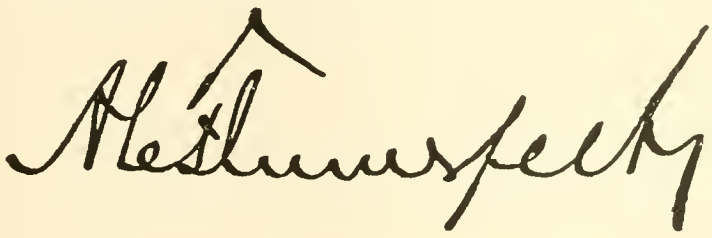
average yield per acre under fairly favourable conditions in the region west of the Cascades is (for new growth) as follows :

At	40	years	12,400	feet	board measure
,,	50	,,	28,000	,,	,,
,,	60	,,	41,000	,,	,,
,,	70	,,	51,700	,,	,,
,,	80	,,	61,100	,,	,,
,,	90	,,	70,200	,,	,,
,,	100	,,	79,800	,,	,,
,,	110	,,	90,300	,,	,,
,,	120	,,	101,500	,,	,,
,,	130	,,	113,000	,,	,,

Figures such as these are extremely encouraging, for we see from them that even in sixty years a heavy crop of Douglas fir timber may be grown. Picturesque as they are, and superfine as is the quality of the clear lumber that they yield, the giant timber of the present crop may be cut without the dismal feeling that by thus destroying the growth of centuries we are irretrievably impoverishing our forest resources. The fact is that most of the coast forests are over-ripe and, if anything, are deteriorating and need cutting. Nature, with a little careful assistance from the forester, will replace the tremendous trees at which we marvel by smaller ones, but the density of the even-aged forests that we shall obtain in the future will produce, on an average, an even heavier stand of merchantable timber to the area than unassisted nature has been able to achieve so far. It is thus easily within the power of the government to secure the permanence of our timber supply.

History is dismal reading to the forester. Many an ancient civilization by butchering its forests struck at the roots of its own prosperity—namely, water supply and the farming industry dependent thereon—and withered away. Others, like China, have by the same action exposed their agriculture to floods and droughts, the horrors of which form an unfailing source of telegraphic news for our daily papers. In more recent times the destruction of the forests has created deserts in Europe, deserts which some countries—Austria and France, for instance—have been reclaiming of late years with great success,

but at an enormous expense. Germany alienated a very large proportion of her forest land, and during the last half-century has been spending money by the million to repurchase and reforest the wasted remnant. Within the present generation vast areas of timber in the United States and in Canada have been ruined by repeated fires. But, though in certain regions the same devastation has made inroads upon them, the forest resources of British Columbia are still largely intact, and it is before, and not after, the approach of ruin that the government has awakened to the vital importance of protecting them and ensuring their permanence.



HISTORY OF FARMING

HISTORY OF FARMING

I

THE PIONEER FARMERS

THERE is a popular misconception that the tilling of the soil was the primal occupation of man; and agriculture, in eulogiums of a literary or post-prandial nature, is often referred to as the earliest and most honourable of all human pursuits. It may, indeed, be described as the earliest form of civilized occupation, but hunting and fishing were before it in prehistoric times as a means of existence. Man lived long on the animals which formed part of his primordial environment, clothed himself with their skins and used their bones and sinews as implements of the chase and of domestic utility, eras before he turned to the soil for sustenance. This was, in a sense, the order of events in British Columbia at a very recent period. The North-West Company and its successor, the Hudson's Bay Company, first exploited the territory out of which the province has been carved for the furs of animals, and subsequently established farming as an auxiliary to their main operations.

It is worth recording that Daniel William Harmon, fur trader, was the first farmer of British Columbia, as well as the first historian of its northern interior. An entry of his on Wednesday, May 22, 1811—note the time of year—at Fraser Lake, reads: 'As the frost is now out of the ground, we have planted our potatoes, and sowed barley, turnips, etc., which are the first seed ever sown this side of the Rocky Mountains.' On May 10, 1815, he again records his efforts at cultivating the soil in the Fraser Lake district: 'We have surrounded a piece of ground with palisades, for a garden, in which we

have planted a few potatoes, and sowed onion, carrot, beet, parsnip seeds and a little barley. I have also planted a very little Indian corn without the expectation that it will come to maturity. The nights in this region are too cold and the summers are too short to admit of its ripening.' It is added that 'the soil in many places in New Caledonia is tolerably good.' So much for the seed-time; now for the harvest. On October 3, 1816, Harmon writes: 'We have taken our vegetables out of the ground. We have forty-one bushels of potatoes, the produce of one bushel planted in the spring. Our turnips, barley, etc., have produced well.' His last reference to agricultural operations is as follows (February 18, 1818): 'A few days since we cut down and reaped our barley. The five quarts which I sowed on the first of May have yielded as many bushels. One acre of ground, producing in the same proportion as this has done, would yield seventy-one bushels. This is sufficient proof that the soil in many places is favourable to agriculture.' In this connection the diarist's observations are almost prophetic: 'It will probably be long, however, before it will exhibit the fruits of cultivation.' It was prophetic because only now, almost a century later, is this district assuming importance on account of its agricultural possibilities. The only agriculture carried on in that vast northern interior up to the present time, except in a very few instances, has been by the Hudson's Bay Company around its widely scattered posts. Alexander Caulfield Anderson, to whom reference will again be made, in a prize essay written in 1872 says:

> At Alexandria long before the general settlement of the province wheat was cultivated on a limited scale. From 1843 to 1848 between 400 and 500 bushels were raised annually at the Hudson's Bay Company's post and converted into flour by means of a mill, with stones 18″ in diameter wrought by horses. As much as 40 bushels to the acre, by careful measurement, and of the finest quality were raised on portions of the land cultivated during the interval mentioned. . . . As high as the Fraser Lake barley yields abundantly, and the potato, with, of course, other culinary vegetables, which come to perfection.

In a footnote he tells us that ' in 1839 the return at Fraser Lake from 15 bushels of cut seed exceeded 700 bushels of potatoes of the Ladies' Finger variety.'

The fur companies, first the North-West Company and then the Hudson's Bay Company, were, therefore, the pioneers of farming in British Columbia, and, if we except the farming carried on at the mission in California, the first on the Pacific coast. The old North-West Company, about 1814, shortly after Astoria was taken from the Pacific Fur Company, carried on some farming at their fort, then changed in name to Fort George.

But Dr John McLoughlin, the Napoleon of the western fur trade, was the great pioneer in agriculture. He had a wider vision than the profits on pelts, and, impressed by the richness of the soil in the old Oregon valleys and the possibilities of trade in agricultural produce on the Pacific, even at the early date at which his rule at Fort Vancouver began, projected a scheme which found favour in Lime Street, London, and the Puget Sound Agricultural Company became an adjunct of the fur-trading company. We learn that in 1837 a large farm produced fruit, grain, vegetables, and cheese. The farm was stocked with cattle, horses, sheep, goats, and swine. Three thousand acres of land were fenced in, and no less than thirty thousand bushels of grain and fourteen thousand bushels of potatoes were harvested. Two flour-mills ground the wheat, and the flour and other products were shipped to Russian America and elsewhere. There were large farms at Nisqually and Cowlitz, and a little later three small farms were established on the southern end of Vancouver Island, which in a lesser way duplicated the operations in Oregon. It is no part of the purpose of this article to inquire into the genesis of the Puget Sound Agricultural Company, or the dubious relation which it bore to the Hudson's Bay Company. What is relevant to the subject is that it did come into existence for a specific purpose and did fulfil an important mission. It was the forerunner and exemplar of everything agricultural on the north-west Pacific coast. It was, for a period at least, very successful. The farms in the neighbourhood of Victoria were perhaps

not as profitable as those in Oregon and Washington, but nevertheless they formed, until 1858, the chief, if not the only, basis of supply for Vancouver Island. In connection with the farms were small industries such as brick-making, saw-milling, flour-milling, etc. It may truly be said that the agricultural business of the Hudson's Bay Company had a great influence on subsequent development on the Pacific. It demonstrated the capabilities of the entire Oregon territory, which at one time included the greater part of British Columbia, and thus placed the industry on a sound basis. The operations in Oregon and in Washington proper were much earlier and on a much larger scale than those in British Columbia, and, as the agricultural conditions on both sides of the line on the Pacific are similar, the experience gained in these States on the one side guided the farmer on the other side.

A great deal respecting the genesis of farming and horticulture, too, is attributable to the servants of the Hudson's Bay Company, individually. The officials were, as a rule, men of keen intelligence and observation. Dr McLoughlin, James Douglas, Dr Tolmie, W. Huggins, Alexander Caulfield Anderson, John Work, John Tod, Roderick Finlayson, J. W. McKay, and many others, brought with them their native love of the soil. They were naturalists to a greater or less degree. They planted trees and shrubs. They saw in the general conditions of soil and climate, in plant growth and in the natural adaptabilities of the entire country, so far as the relatively small areas of fertile land were concerned, a splendid field for agriculture and particularly for horticulture. British Columbia was Scotland and England reproduced on a huge scale, and similar to them in many of its physical characteristics; and the officials who settled on Vancouver Island after retiring from the service first gave the province the impetus towards efficiency in horticulture and small farming. It was they who imported seeds and plants and flowers, made orchards, and demonstrated vegetable and grain and stock possibilities. Before Vancouver Island had cast off the sovereignty of the Hudson's Bay Company and the mainland of British Columbia had

become a sister colony in the Empire, that corporation had indicated a wide agricultural and horticultural field for development. It had gardens and orchards and fruitful fields, even though limited in extent, under cultivation, and those who came in numbers in 1858, 1859, and 1860 to search for gold could not but be impressed with the greater potential wealth of the soil. Many were disappointed in their search for gold, and as a consequence took up land, and thus the nuclei of an industry were formed.

II

AGRICULTURAL POSSIBILITIES OF BRITISH COLUMBIA

IN the files of British Columbia newspapers from the earliest date of their publication can be found frequent and very intelligent reference, editorially and otherwise, to the subject of agriculture and fruit-growing. Finding settlers to utilize the arable land available continued to be a problem for a long time. Even to-day the problem is a live one. This is demonstrated by the fact that a royal commission is investigating the facts bearing, among other things, on that very question. The progress of agriculture in British Columbia, from the very nature of the physical conditions of the country, to be referred to later at some length, was necessarily slow in comparison with the progress of the eastern parts of British North America ; but we find that at a very early date, apart from the beginning made by the Hudson's Bay Company and its officials, in the delta of the Fraser and in several districts in the vicinity of Victoria on the Island of Vancouver some progress had been made.

The Rev. R. C. Lundin Brown, in a prize essay printed in pamphlet form in 1863, speaks of the agricultural prospects as follows :

> Although as an agricultural country alone British Columbia will not become great, she has, nevertheless, as we have seen, arable and pasture lands sufficient to maintain a large mining and commercial population.

He asks the question, 'Can British Columbia support an agricultural population?' His reply is interesting from several points of view. He says that 'the general notion in Europe was, as, indeed, it was everywhere, that the country was little better than a "howling wilderness" wherein half-famished beasts of prey waged eternal war with a sparse population of half-starved savages; where the cold is more than Arctic and the dearth more than Saharan.' He quotes the words of the chancellor of the Exchequer in the House of Commons, uttered twenty-one years previously: 'These territories are bounded by frost and banked by fog, and woe betide any unfortunate individual who might be so far diverted from the path of prudence as to settle in these parts.' Brown remarks upon this, with some truth, that the first impression a stranger would receive might seem to confirm such a view, especially if by some aerial flight he happened to land among the mountains in midwinter.

Brown in the pamphlet in question refers to a farm below New Westminster, in the Fraser River valley, comprising fifteen hundred acres 'where cattle fatten rapidly and whatever is sown grows well.' He was able, from information obtained from various reliable sources, to indicate as likely to prove fruitful such localities as the Okanagan, Thompson River valley, the Nicola, Lillooet and Cariboo districts, and the country around Fort George, which have since proved to have excellent agricultural possibilities in spots. Although cattle-ranching had scarcely begun then, Brown says that for stock-raising the country is unrivalled, and dwells particularly upon the nutritious character and extent of the bunch-grass of the dry interior. If we consider that this pamphlet was written in 1862, when the entire mainland was a wilderness, as unfamiliar to the arts of husbandry as are the wilds of Labrador, except in so far as these were practised in a limited way around the various posts of the Hudson's Bay Company, we shall see that the progress made up to that time was remarkable. The explanation of this is the demand created by the rush of miners and the difficulty of keeping them supplied with food. In the vicinity of New Westminster there was considerable prairie and open land, and with the

ALEXANDER BRIDGE, FRASER RIVER

facility of acquiring land, almost for the asking, it was an easy thing to raise cattle, sheep, etc., and to produce vegetables, poultry, and eggs. In the Cariboo and Lillooet districts, where the mining industry was concentrated, there were here and there suitable spots for ranching, and the shrewd man, who saw opportunities in the land and was not lured by gold *in situ*, set to work to supply the miners with beans and chickens and eggs and milk, pack-horses, etc.; and these early operations were very profitable. This condition of affairs obtained in nearly every part of the province to which there was a rush of miners and where there were similar agricultural opportunities, and in this way a settler, after the temporary excitement in one camp after another had subsided and the prospectors had sought other fields, was left here and there to eke out an existence in a somewhat primitive way, and to form the kernel of a settlement which was to germinate and grow as the province developed. If not already married, he usually took to himself a daughter of the 'duskies,' and gradually, with a mixed family growing up about him, progressed with the country. In this way the cattle ranches of the interior came into existence, and there was produced a race of what we now term 'old-timers,' who, as their herds multiplied, waited with patience for the railway and the miner to make their holdings valuable. As there was no inducement to work or to raise crops that could not be marketed, these men settled down to an easy life of 'cow-punching,' which was more or less conducive to laziness and lack of public spirit. The male members of their families became 'cowboys,' and the female members married within the fraternity. There were a few localities more favourable than the others, like the valley of the Okanagan, where wheat was grown and orchards set out.

This description does not apply to all persons who became farmers or ranchers. Many of these men were of superior education and had had a good practical training in their homeland, and some of them were very enterprising and turned their opportunities to the very best advantage. It refers to a class which was characteristic of the interior and of British Columbia and of every other part of Western

America where similar conditions have existed. The old-timers, so far as they or their families have survived, have of recent years come into a very handsome reward for their long period of isolation and waiting. The new interest in fruit-growing and small farming, as the result of railway development, created an inflation in farm-land values, and syndicates organized for the purpose acquired these large holdings at high prices and subdivided them. So the old order of things is rapidly passing away, and the old-timer as a species will soon be as extinct in British Columbia as is the great auk in the bird world.

Returning again to Brown's pamphlet, we find among its most interesting features a list of prices of the various agricultural products.

> In the interior the great price of freightage acts as a high protective duty. Hitherto all the flour used in the colony has been imported, its present prices being at New Westminster £3 per barrel; at Lillooet £4 per barrel; in Cariboo £40 per barrel, more or less. Barley will always be in great demand, where so many horses and mules are employed; its price in June, 1862, was 12s. per cwt. at New Westminster; £3 per cwt. at Lillooet—further up the wagon road £5 per cwt. The price of hay ranged from £6 per ton to £20 or even £25 per ton, according to the locality.
>
> Prices of vegetables vary exceedingly according to the supply, the season of the year, etc. The following are the average prices throughout the past year:

PRICES OF VEGETABLES AT NEW WESTMINSTER, LILLOOET, AND CARIBOO IN 1862

	New Westminster	Lillooet	Cariboo
Potatoes	6s. to 16s. per cwt.	8s. to 20s. per cwt.	£10 per cwt.
Beans	60s. „	80s. „	£12 to £16 per cwt.
Turnips	8s. „	16s. „	£8 „
Onions	40s. to 80s. „	£3 to £4 „	£20 „
Carrots	10s. „	20s. „	
Cabbages	1d. to 1½d. per lb.	16s. per lb.	
Peas	1s. 6d. per lb.	2s. „	
Corn (Indian)	3s. per doz.	4s. per doz.	

The number of sheep imported in 1862 was 6946 ; of cattle 5640 ; of horses and mules 6427.

Average prices of farm produce in 1862 :

Beef, 1s. per lb.
Mutton, 1s. per lb.
Butter (fresh), 4s. per lb.
Milk, 4s. per gallon.
Cheese, 3s. per lb.
Bacon, 1s. 5d. per lb. (in the mines 4s.).
Hens, 4s. to 16s. each.
Eggs, 4d. to 1s. each.

These prices may seem high, but even the articles which in a new country are counted luxuries, such as milk, fresh butter and eggs, people are always glad to purchase, and the supply by no means equals the demand. At the Grange, near Lillooet, 30 lb. of butter were sold weekly at 6s. per lb., and a farmer at New Westminster weekly disposes of 30 lb. for 4s. per lb.

Brown, though a careful observer and accurate in his statistics, was nevertheless a clergyman with no agricultural experience, and was inclined in his enthusiasm to proceed on the lines of the woman who counted her chickens before they were hatched. He cited the case of a man—and he was writing, for immigration purposes, a pamphlet which was widely distributed by the government of the day—who 'two years ago bought a cow, for which he paid $140 ; that summer he made $350 by the sale of her milk and butter ; now she has three calves, each of them worth $100,' thus illustrating his confident views as to how a man might get rich quickly by stock-raising and dairying in British Columbia. But he was even more enthusiastic about sheep, having in mind, it is presumed, Jacob's experiments upon Laban's flocks. He tells us :

> By a simple calculation it might be shown that 100 ewes and two rams would, in the course of five years, supposing the produce to be one-half lambs, and the wethers to be sold, increase to the number of 1000. This calculation supposes the ewes to lamb twice a year, and to have twins one time in three, which is under the average. Sheep cost in Victoria £2, and rams £20 (Southdowns). The animals would cost little, summer

> or winter, and the wethers being sold for mutton, the proceeds would cover the wages of a shepherd. As mutton costs 1s. to 1s. 3d. per lb. (and the sheep average 50 lb.) it is easy to see that even allowing a wide margin for casualties, a small fortune could thus be realized in the course of a few years. The fleeces might either be turned to account in the country itself, or exported; the price of wool at San Francisco is 40 cents per lb.

These observations have been quoted as a text upon which to hang certain statements. Contrary to such sanguine expectations, sheep-raising has been practically a failure in the province, and only under exceptional circumstances has it been practised at a profit. Conditions are against the industry. In the interior sheep-raising and cattle-raising cannot be carried on together, and in addition to that sheep-pasturing is very destructive to the bunch-grass. On the coast there is very little range for sheep, and the wet weather is injurious. Locally there is little or no market for wool. Neither has cattle-raising been specially profitable, although it was for a long time the staple industry of the interior. In the neighbourhood of the towns and cities dairying has been carried on for years with profit, but within the past ten years the price of suburban real estate has gradually eliminated farming operations, and dairying cows are stall-fed, the price of milk increasing from five cents to fifteen cents a quart as a consequence. Cattle in the vicinity of the coast have never paid for beef purposes, for the simple commercial reason that the local supply has not been sufficient to meet the large demands for meat, with the consequence that butchers contract with the ranches in the interior and elsewhere for a regular supply the year round, so that the local beef when offered is not wanted. The same is true of sheep as mutton, the supply coming from Oregon or from the Middle West. The only items in the way of live stock for which there was a demand were: calves for veal, spring lambs, pigs, poultry and horses, this notwithstanding that the price of beef was high and the consumption very large. This condition obtained for a long time in connection with fruits and vegetables of all kinds.

Until the local supply became sufficient to satisfy the demand fully, all, or nearly all, agricultural products were imported through commission houses in cities south of the international line. It can readily be understood how, in the face of the natural difficulties in making the lands productive by clearing, the imperfect communication by roads, etc., this condition operated against development, which, in spite of high prices, big demand, and great natural fertility as well as adaptability for widely diversified products, has been slow and difficult. It is very hard for a citizen of Ontario, or any of the older settled provinces, to understand why such an apparent anomaly should have existed or should in a lesser degree exist at the present time. Many would be apt to reason like the Rev. R. C. Lundin Brown.

In 1872 the British Columbia government offered a prize for the best general description of the province for the purposes of immigration. This was won by Alexander Caulfield Anderson, a student and a close observer, who was not only scholarly, but specially well informed regarding the economic capabilities of the province, having travelled over the greater portion of its area as a high official of the Hudson's Bay Company. Agriculture had made considerable advance since Brown's time. There were at least half a dozen agricultural societies holding exhibitions—at New Westminster, Victoria, Saanich, Cowichan, and in the interior—which would indicate that a considerably larger area was under cultivation, even if those exhibitions were very small affairs in themselves. From Anderson we learn that in 'the settled portions of Vancouver Island all the common cereals are produced abundantly.' He likewise gives some remarkable yields per acre. He speaks of the peninsula near Victoria where 'the muskmelons and watermelons attain perfect maturity in the open air without artificial aid; the tomato and the capsicum yield copiously; the peach ripens its fruit, and a standard of the grape (the Isabella variety) produces abundantly and comes to maturity in a favourable exposure.' Anderson was perhaps a little optimistic regarding these products, which only succeed in favourable seasons; they are mentioned no doubt to show that, despite

the cool nights which prevail everywhere along the coast, at least moderate success had been achieved. In the southern interior, however, almost everywhere in the dry belt these warm fruits thrive luxuriantly and produce enormously. Quoting from James Richardson, of the Geological Survey of Canada, Anderson gives particulars of agricultural production in the Comox district, 140 miles north of Victoria, on Gabriola and Salt Spring Islands and in the districts of Saanich and Nanaimo, which show that as far back as 1871 considerable advancement had been made in crops of all kinds, including fruits.

Anderson was a trained observer, and, as a consequence of his experience in British Columbia, an optimist in regard to farming. He says:

> To sum up the qualifications of British Columbia as a field for settlement, I may succinctly state that, though it may never become a large exporter of cereal products, like the western states of America or California, it possesses within itself all the requisites for success; and the power to support, in connection with its varied industries and external relations, a population of at least several millions in ease, happiness and comparative affluence.

Brown and Anderson have been quoted, so far, freely and particularly for the reason that they are practically the only sources of information available as to the industry during the two periods of which they write, and they give a fairly accurate impression of conditions in 1862 and 1872 respectively. From the Ontario standpoint, for instance, what was produced, small even compared with the amount of local consumption occasioned by 10,000 white inhabitants, would scarcely be worth considering. To-day one or two counties of Ontario produce as much as all British Columbia; but the latter province is capable of producing some day $250,000,000 worth of farm products annually. In 1912 the value of production was $22,500,000.

III

AGRICULTURAL EXHIBITIONS

A WORD or two is necessary in reference to the first agricultural exhibitions held in the province at Victoria and New Westminster respectively. Compared with the present ambitious endeavours at these places, which are spread over a week and fill many buildings and draw many thousands of people daily, the initial undertakings were dwarfish and insignificant; but they were the beginnings, the acorns out of which big oaks have grown. The first settlement on Vancouver Island took place about 1849, and although the settlers for some years were few, there was an increasing area of land brought under cultivation, especially in the vicinity of Victoria, so that one need not marvel that the first exhibition was held there as early as October 2, 1861, during which year an agricultural association had been formed. It and several succeeding annual shows were considered of such importance as to warrant leading editorials and much general newspaper comment, even though the list of prize-winners was not a long one. The newspapers do not say what the attendance was, but judging from the 'prominent' citizens who were mentioned in the account of the first show, it might have amounted to five hundred persons. It was an important function for those days, and the visitors included the governor, naval officers, and members of the civil service. The show was held in the Victoria market enclosure, and we are told that the 'success' was due in a very great degree to a few gentlemen connected with the Hudson's Bay and Puget Sound Companies' farms. Needless to say, if these had failed to participate, it would have very much resembled a production of *Hamlet* with the melancholy Dane omitted from the cast. The next in competition, we are informed, were a number of 'new settlers.' The 'old settlers' were 'George Dean and Mr Van Almond.' Note the distinction between 'old' and 'new,' notwithstanding that the first 'new' came after 1858 and the 'old' after

1851. A coloured farmer from Salt Spring Island sent in some potatoes and Indian corn. Otherwise the exhibits 'were confined almost strictly to the district immediately tributary to Victoria,' and, considering the small area represented and the infantile stage of the industry, they were 'highly creditable.' They comprised grains of all kinds, vegetables, flowers, fruits, cattle, horses, sheep, pigs, etc.—a miniature in most respects of all fairs since, including side-shows and log-cabin quilts. The newspapers marvelled at the 'size and quality of the vegetables' and the 'splendid specimens' of stock shown. Among the list of exhibitors it is pleasant to stumble on the names of Governor James Douglas, Dr W. F. Tolmie, John Work[1] (brother of the late venerable Senator Wark), and Kenneth MacKenzie, all of the Hudson's Bay Company.

W. H. Keary, ex-mayor of New Westminster, and for many years secretary and manager of the exhibition held in that city, has given the following terse description of the first fall show held there :

> The first exhibition held in New Westminster was in October, 1867, and it was entitled 'Agricultural Exhibition, New Westminster, B.C.' The Hon. John Robson was chairman of the committee of management, and W. D. Cormick, Esq., corresponding secretary. I have a copy of a diploma issued to R. Ker, . . . for the best hops exhibit at this agricultural fair. I understand that they [the exhibition association] had about seven animals—one bull ; one cow ; two sheep ; two pigs ; one goat ; a few apples and potatoes ; cabbages ; turnips and garden products, and that is about all. However, the exhibition has been continued from that date continuously.

The New Westminster exhibition is now the largest held in the province and compares favourably with some of the more important eastern fairs.

[1] See p. 86.

IV

CONDITIONS AFFECTING AGRICULTURE

IT has been stated in the foregoing that the conditions affecting agriculture in British Columbia are peculiar, the result of physical conformation, and no one who is not intimate with the conditions can easily understand the unusual difficulties attendant upon agricultural development, notwithstanding that in many respects the province has advantages over other parts of Canada; but if a reader could elevate himself sufficiently high to get a bird's-eye view of the entire surface of British Columbia, he would then comprehend in a measure what these conditions are. The area of the province is, roughly speaking, 381,000 square miles, or roundly 250,000,000 acres. Now, no one knows exactly what proportion of that vast territory is arable. The officials of the Land department at Victoria would not undertake even to approximate it, because, while the greater part of the surface has at various times been roughly explored by the Hudson's Bay Company officials, by prospectors and miners, by hunters and trappers, by travellers, by railway engineers and provincial land-surveyors, there are large sections—whole districts, in fact—about which little is definitely known. Only small areas, comparatively speaking, have been surveyed, and on account of the physical magnitude of the task it will take many years to determine what is available for tillage, assuming that all the province could be made accessible by communication. The writer has, however, from such sources as are available, made an estimate, and has endeavoured from time to time to confirm this estimate. The conclusion reached is that the arable land does not exceed 12,000,000 or 15,000,000 acres at the outside, less than one-twentieth of the whole. This aggregate is made up of scattered areas of 10,000 acres and upwards extending from the Delta district eastward to the Tobacco Plains on the southern boundary, and from the head of the Nass valley, where Alaska touches British Columbia, eastward to

the limits of the Peace River country in British Columbia. These areas are in no way uniform or related to each other.

It is extremely difficult to give an impression that will reflect uniformly, or at all adequately, actual conditions. The entire Cordilleran region is, physically, extremely irregular, and geologically the strata are much broken, and no particular formula can be made to apply to the soil, climate, and, so to speak, agricultural formation. There are certain large, irregular areas to which certain physical characteristics in the main belong, but within these areas conditions are not all uniform; and consequently what might be true of the soil, climate, or adaptabilities of one locality might not be at all true of those of another region only a few miles distant.

In order to realize more fully the obstacles to rapid development, the following circumstances must be taken into account: that there are few compact areas of uniform character that can be cut up mathematically; that except along valleys with river or railway communication, or along the sea-coast, or in favoured locations near to the towns, there are no market facilities; that some of the larger and more desirable tracts of land have up to the present been too remote to be settled; that the building of highways and railways and the making of surveys are unusually expensive in a country like British Columbia, and, until very recently, the financial situation has not permitted the carrying on of works of this character extensively; that there is but little open land, and but little of that which does not require drainage, irrigation or protection from overflow; that by far the greater part of the arable land has to be cleared of a heavy growth of forest; that the agricultural land being relatively limited, the price is correspondingly high; that the local rates of transportation are high; that interest charges and the price of labour are higher than in the East, and generally speaking the cost of living is greater; that outside of the ranching country and open meadow lands there is but little pasturage except what is made by clearing, and the forage in the woods is scanty indeed; that in the very nature of the products to which farming in the main is limited—fruit-

growing and small farming—more intensive farming is required, and it takes longer to make the land at first productive.

Added to the difficulties imposed by nature are those for which governments of the past are responsible. In the early days, and, in fact, until very recent years, governments always being in need of ready money, land, being an available asset, was parted with at very low prices and practically without any conditions being attached. The consequence was that it was taken up in large tracts, selected at will in the most favourable localities, without reference to system of survey or availability in the matter of roads and other public conveniences. In this way settlers were scattered here and there in an isolated fashion over a large area, causing unnecessarily large expenditures, which in the aggregate were quite inadequate. A great deal of the land thus alienated was not settled upon at all. No history of agriculture in British Columbia could be written without taking into consideration all these facts, because they account for a backwardness, in view of the many obvious natural advantages, that characterized the industry for many, many years.

V

LEGISLATIVE ACTS AND AGRICULTURE

IT will now be in order to discuss the legislation and some of the administrative acts affecting agricultural interests in British Columbia from the earliest colonial days. In this connection it is well to keep in mind the peculiar character of the industry they were intended to aid, encourage, or protect; and the reader will readily see that legislation which might uniformly apply to other provinces of Canada would be largely inapplicable in the most westerly province.

Land being the basis of agriculture, the first consideration is that of the laws governing the acquisition of land for the purpose. During the Hudson's Bay Company régime in Vancouver Island these may be said to have been very unsatisfactory, or, more properly speaking, the entire arrange-

ment under which the grant of the island was held was unsatisfactory, and prejudicial to the very objects for which it was ostensibly obtained. The prime objects moving the imperial government to make a grant of the island to the company were settlement and development; and at the time, owing to the peculiar state of affairs on the Pacific coast, it was thought that the Hudson's Bay Company, which undertook the responsibility, was best qualified to shoulder it. Settlement and development, however, were among the least of the considerations by which that corporation was influenced. Hence conspicuous success resulting from the arrangement should not be anticipated. It is not necessary here to discuss the terms of the grant or the circumstances out of which the quasi-sovereignty of the Hudson's Bay Company arose, because these are dealt with in the historical treatment of the subject elsewhere;[1] but it is pertinent to remark here that they were at least calculated to accomplish the object which the home government had in view. The price of the land to settlers (one pound per acre); the conditions under which it could be obtained; the fact that the company reserved all the land within a considerable radius of Fort Victoria for its own use or the use of its officials; the facts, also, that the land available for settlers, thus remote, was expensive to clear and cultivate, and that the settlers were entirely dependent upon the company for what they had to buy and what they had to sell—these were all highly inimical to the development of an agricultural industry under corporate rule. It is therefore unnecessary to discuss the early colonial days of Vancouver Island as part of an agricultural thesis; useful results were just as reasonably to be expected as was success from the ancient Israelitish attempt to make bricks without straw. All that was really accomplished from 1849 to 1859 was to demonstrate, from the limited way in which farming was carried on, that it had possibilities under more favourable auspices. We must look to what was done in Vancouver Island after the monopoly had been removed, and to the colony of British Columbia after it came into existence in 1858.

[1] See section 1, p. 149 *et seq.*

First let us consider the colony of British Columbia. Governor Douglas in his instructions from the secretary of state was warned against allowing lands to get into the hands of speculators and being locked up from beneficial use. It would have been well if the spirit of these instructions had permeated the official mind which directed these two colonies and had determined the policy of subsequent administrations; but Douglas and his successors in office are not to be blamed so much as might appear at a first glance. They were given the responsibility of administering the country out of the resources of the country, and only those who know the nature of the financial task can understand how slender these were in comparison to the obligations assumed. Douglas applied for aid to the imperial authorities, but was given to understand that a country as rich as British Columbia was supposed to be must depend for support upon its own resources. Hence, in order to supply pressing needs, land, being the readiest asset to draw upon, was disposed of on terms that were likely to be most attractive to investors. One can readily conceive of a system of co-operation between home and colonial authorities whereby the credit of the former could have been lent to the latter, and the land and other assets might have been wisely conserved and settlement directed in a systematic way so as to ensure compactness of settlement and gradual expansion, with provision for improvements that would have made the lot of the settler not too hard, facilitating his operations and making them profitable.

In his proclamation of February 14, 1858, Governor Douglas fixed the price of agricultural land at ten shillings per acre, half to be paid at the time of purchase and the balance in two years. All other lands were to be put up for public competition at an upset price. The law—proclamations had the force of law—was changed in January 1860, providing for pre-emption of 160 acres in rectangular blocks, pre-emptors having the right to acquire any other quantity of land they desired at ten shillings per acre. This was modified by several subsequent proclamations, and in August 1861 the price was reduced to eight shillings per acre for

pre-emptions and to two shillings and one penny per acre for further purchases, the process of alienation becoming easier as time passed on. On Vancouver Island, by ordinance, the price of land was fixed by competition at an upset price, but provision was made for pre-emption of 150 acres for single men, 160 for married persons with an additional ten acres for each of their children. The price fixed was four shillings and twopence per acre, and a residence of two years was required. On the mainland the conditions were again changed: all lands were to be put up for public competition, and lands not sold at the upset price could be sold privately at that price. Provision for pre-emption remained, but the most the pre-emptor could purchase in addition was fixed at 480 acres, at four shillings and twopence per acre. It was permitted to divert water for agricultural purposes, and land in any quantity could be leased. Later on, other ordinances were passed to prevent the stealing of cattle and to provide for the fencing in of land on the interior ranges.

The foregoing briefly outlines legislation up to the time of Confederation. It will thus be seen that, without any system of surveys except those made by the owners of land and without practically any conditions attaching to the sale, vast areas could be alienated. As a matter of fact, wide tracts of the best and most available land were parted with in large blocks, to the detriment of bona fide settlement, and, consequently, of the development of agriculture. A somewhat similar system was continued after Confederation, and at that time much harm had already been done. This unwise legislation appears all the more deplorable when it is considered that arable land was extremely limited, and that it was obviously in the best interests of the province that it should be carefully conserved and surveyed into small holdings for the benefit of the greatest number.

In 1872 the legislature awoke to a sense of its responsibility and imposed a tax on wild land, which was promptly disallowed on the ground that the land had been unconditionally alienated. Another act was passed providing for the pre-emption of 160 acres west and 320 acres east of the Cascades, requiring four years of occupation, at the price

of one dollar per acre, payable in four years. In 1875 the term of occupation was changed to two years, and the laws in these respects have remained unchanged. Leases for pastoral purposes unlimited as to area were authorized; also hay leases limited to five hundred acres. Land was thrown open at one dollar per acre without limit as to area, and the minister of Lands was permitted to make free grants for colonization purposes. During the legislative session of 1872 it was decided to adopt the Dominion tariff, which was lower than the British Columbia tariff. There was a section strongly opposed to it on the ground that it would be unfair to the farmer, about whose interests a great deal of discussion centred, but the agricultural interests were not of sufficient moment at that time to weigh against the general interests.

In 1873 an act entitled the Drainage, Diking, and Irrigation Act was passed. Under its provisions the majority of persons in a district could co-operate for the purpose of carrying on any of the objects implied in the title, under the direction of a commissioner, something after the manner of procedure in the Ontario Drainage Act. This act was amended in detail on several subsequent occasions. In 1874 an act to incorporate agricultural societies was passed. In 1875 an act was passed respecting the branding of cattle, in order that cattlemen should be protected in their herds. The tax legislation of 1876, imposing a general system of direct taxation, affected farmers, inasmuch as farm lands, as real estate, were assessed and taxed for the first time. Naturally this tax was very unpopular, but owing to the financial exigencies of the time it was justifiable, and has, with modifications from time to time, continued in force ever since. In the same year an act was passed for the better protection of cattle ranges, that providing for the keeping apart of cattle and sheep.

In 1877 an act was passed to prevent the spread of thistles, and in that year also the Island Pasturage Act. The latter had reference to sheep on the islands in the Gulf of Georgia, and had for its object the prevention of others than preemptors or owners of land pasturing sheep there. At this

time, and for a long time previously, these islands were convenient places where dealers having sheep to sell might pasture them free of charge, and they also served as excellent hiding-places for animals stolen from the United States side of the international boundary. Later on there were a number of minor acts, among them one for the extermination of wild horses, which in the interior had multiplied so rapidly as to have become a nuisance, stampeding the range horses and unnecessarily depleting the ranges of pasture. Another act that went into force in this early period of agricultural legislation was for the prevention of contagious diseases among animals. A few years later, in 1888, an act to prevent the spread of noxious weeds was passed.

An important change in the Land Act was made in 1884 by which land could be purchased in 640-acre sections at two and a half dollars an acre, and other lands unfit for agricultural purposes in similar areas at one dollar per acre. This feature of the Land Act has remained with modifications up to the present time. Subsequently the classification was changed to five dollars, two dollars, and one dollar per acre for first-, second-, and third-class lands respectively; and more recently the classification was changed to first- and second-class land at five dollars and two and a half dollars per acre respectively. In 1910 the government raised the prices to ten dollars and five dollars. Under these land purchase provisions something like 2,500,000 acres have been alienated and, unnecessary to say, these areas include some of the best land in the province. As a stimulus to improvement, however, these lands are taxed as wild lands, until improved, at four per cent per annum on the assessed value of the lands.

In 1873, notwithstanding the limited amount of farming carried on, provision was made for a minister of Agriculture, the first to hold the office being W. J. Armstrong, of New Westminster. It was not until 1894, however, that the department was organized. In that year an act was passed regulating and defining the powers of the minister of Agriculture and his officials, and making provision in particular for the collection of statistics. J. R. Anderson, son of

Alexander Caulfield Anderson previously referred to, was the first statistician and secretary of the department, and was afterwards created deputy minister. From 1894 onward a great deal of important work was carried on by the department. J. H. Turner, who was minister of Agriculture as well as premier, took a deep interest in horticulture and agriculture, and every effort consistent with the financial resources of the province was made to encourage the industry. One of the very important things done was the passing of the Horticultural Board Act, the provisions of which were amended from time to time, and regulations were made and put into force providing for the inspection of importations of fruits and nursery stock and for the prevention of insect and other pests. By the rigid enforcement of this act British Columbia has been able to remain comparatively free from those insect and other diseases which have affected the fruit industry in many other parts of America. In this connection it might be stated that in 1890 the interest in fruit-growing and horticulture was very keen, and an act was passed incorporating a Horticultural and Fruit-Growers' Association largely on the lines of the Quebec and Ontario acts, and for a time much useful work was done by the association. In 1896 an act was passed providing for the formation of associations on the co-operative plan, which enabled farmers and others to combine for commercial purposes on a very cheap and expeditious basis. Very little resulted, however, from this measure. In the same year the Dairy Association Act was passed, providing for the incorporation of a Provincial Dairy Association, the incorporation of Cheese and Butter Associations, and the establishing and aiding of co-operative creameries. Under the last-named provision a number of creameries were established and the dairy industry began to take form and prosper, the output being materially increased and the quality of the product improved.

Another important departure was made in 1897, when the Farmers' Institutes and Co-operation Act became law. With the exception of the co-operative feature the act followed the line of Ontario legislation, and under its provisions a number of Farmers' Institutes were formed, with

a Farmers' Central Institute, which holds meetings once a year. There are now about eighty Farmers' Institutes, with a number of women's auxiliary associations, and the work is very actively carried on in various ways—by lectures, distribution of literature, etc. The co-operative feature, whereby farmers could form themselves into an association for carrying on the produce business, was taken advantage of in one or two instances only, and in each case the experiment was not a success. Farmers, above all classes of a community, are least inclined to co-operation, and in this respect require very considerable education. One of the problems facing the farming community in British Columbia now is that of co-operation on a commercial basis in order to provide for proper distribution of their products and for a legitimate profit on the same, which profit is at present absorbed by middlemen.

One of the most progressive steps forward was taken in 1898, when the Agricultural Credit Associations Act was passed. This was to enable farmers, as associations, to borrow money from the government for various purposes, and to loan it to each other, on the principle of the German land banks, which have been marvellously successful in providing cheap money for agricultural purposes. Although at the time great pressure was brought to bear on the government to loan money to farmers at low rates of interest, it is somewhat strange that not a single application has been made to the government under the legislation in question, and not a single attempt has been made to organize an Agricultural Credit Association. In fact, the very existence of the act has been forgotten by those who were in the province at the time when it was passed, and it is unknown to the newcomers.

This review of the history, conditions, and legislation affecting agriculture brings us to the present period, when the industry has entered upon an entirely new phase. During the last fifty-five years agriculture has gone through a variety of experiences. At the outset it enjoyed a few years of comparative prosperity on account of the inrush of population and the extraordinary demand and the high prices for

farm products. Then came the lull following the decline in placer-mining, and farming varied little in its fortunes and made comparatively little advance until the commencement of the building of the Canadian Pacific Railway through the mountains, when it again received a decided stimulus. From the time of the actual commencement of the great enterprise referred to until about 1892 times were good in the province and agriculture prospered accordingly. There was a steady, if not a large, demand for farm lands; and in government lands for speculation, both timber and, prospectively, agricultural, there was a boom. Then followed the financial collapse in the United States, which preceded a general depression throughout the world: the agricultural and land interests suffered severely, and the outlook for a time was very depressing. The surplus foods and fruits of Oregon, Washington, and California, the prices of which were very low at home, were poured into the province, and conditions were indeed hard for the farmer of British Columbia. The lowest ebb was reached probably during 1893 and 1894, but until about 1898 there was little improvement. Most of the farms had become mortgaged while times were good, for speculation or the purchase of lands, and interest bore heavily on the borrowers. There was a general demand for cheap money on the New Zealand principle, which the government in 1898 staved off by passing the Agricultural Associations Act, sound enough in itself, but not calculated to satisfy the man who was paying eight or nine per cent to the mortgage companies and wanted money at four per cent to pay them off. By 1903 and 1904 a marked improvement had taken place, and from that time onward until the year 1912 land values increased enormously. It was during this period that so many of the larger ranches of the interior were purchased to be subdivided on the small-holding plan. Probably 100,000 acres in Okanagan, in the vicinity of the Kootenay lakes, in the valleys of the Thompson, Lillooet, Similkameen, and in the lower Fraser valley were thus dealt with. The growing of fruit on the Oregon and Washington plan was adopted with enthusiasm, and most of the lands indicated proved to be suitable for the purpose, particularly for apples.

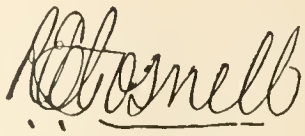
A series of exhibits of this fruit in Great Britain and elsewhere succeeded in carrying off all awards. The government showed great activity in the work of publicity, and the work of the department of Agriculture so expanded that the appropriations for the purpose grew in nine years from $20,000 to $265,000, and the departmental staff of three or four was increased to forty, engaged in experimental and educational work of all kinds on modern lines. Now all this, excellent and encouraging as it was, formed so much fodder for the real estate interests, which exploited the possibilities of every available section until the price of land soared to one hundred dollars and even as high as one thousand dollars an acre, reaching a point where it was much more profitable to sell than to farm the land. This imaginary prosperity has not helped the industry as such, however much it may have enriched the fortunate owners of land who disposed of their holdings ; and it has greatly complicated the problems connected with agriculture. In 1913 witnesses before the Agricultural Commission appointed to investigate these problems stated that the only way to make a profit from farm-land in British Columbia was to sell it. This is an exaggeration, no doubt, but it is true in one sense : the land, however fertile, has got beyond its productive value. With the high cost of living and the high price of labour added, the situation has not improved. It is, however, not a serious one, except that a great many persons have bought land at too high a price, and must consider a certain amount of their investment as loss. The prevailing conditions will adjust themselves. When the element of speculation in real estate has been eliminated and the owners of the land return to the serious business of farming on its own merits, the industry will take another upward turn and be placed upon a permanently sound basis.

There are many advantages for farming in British Columbia. The valleys are extremely fertile, the climate in the main is most favourable, the general conditions of physical and social life are pleasant, prices are high and the demand exceptional, and the lot of the farmer is, on the whole plane of existence, as good as, if not a little superior to, that of

his brother tiller of the soil in any other part of the known world to-day.

There is a general spirit of emulation and ambitious effort being displayed, in co-operation with which are the work of the Farmers' Institutes and the splendid educational machinery put in operation through the agency of the department of Agriculture. There is, therefore, every reason to hope for an agricultural and horticultural development in specialized forms, not equalled, except in isolated instances, in any other portion of the globe. In specially favoured localities and under specially favoured conditions the farmers of British Columbia are reaping rich rewards and doing exceedingly well—not a few of the older men having become rich. But it is not safe to judge of the general status of the industry by these peculiar instances, and it is to avoid a possible misapprehension that attention is called to the fact here. Turning again, however, to the special advantages of farming—upon which perhaps too much stress may be laid —there is one which pertains everywhere: the value, from the real estate point of view, of land that has been brought under cultivation. The pioneers who have for so many years nursed their holdings are now becoming independent on that account alone. It is a circumstance, also, that has so materially contributed to the active speculation in land throughout the province. The relatively limited area makes arable land the more valuable as it has relation to prospective development in its locality. Therefore, if the farmer does not pay too much for his land in the first instance, locates or purchases it with an intelligent view to the future and to its potential value for farming, he has an almost certain profitable investment, and with skilful or even average intelligent cultivation he can hardly fail to obtain excellent results ; because it seems yet a long time off when production will fully meet the demands of consumption, and when there will not be a demand for his land by others. In the future, when the speculation in land for real estate purposes shall have subsided and the value of land is measured by its productive capacity alone, the farmers with unencumbered land under cultivation will be as a class the best off on the

average in the province. In very many communities the farmer is still struggling against many natural disadvantages, and it will be some years yet before in every part of British Columbia he will have passed the pioneer stage inevitable in new countries, but his certain success will be all the greater and his satisfaction the more real when his initial difficulties shall have been overcome.



MINES AND MINING

MINES AND MINING

BRITISH Columbia possesses large mineral resources. These are varied in character and some of them occur in immense quantities. They include gold, silver, lead, copper, iron, zinc, coal, building materials, etc. The latent possibilities of the mining industry of the province are, therefore, very great. In this article features of the history of the development of the mining industry of British Columbia and statistical information will be given.

British Columbia, Part of the Cordilleran Region

The singularly favourable position, as a part of the great Cordilleran belt, occupied by British Columbia in regard to its mineral resources, is given prominence in *Geology and Economic Minerals of Canada*, published by the Geological Survey branch of the Dominion department of Mines. The Cordilleran belt

> in South America, in Mexico, and in the western United States is recognized as one of the greatest mining regions in the world ; noted principally for its wealth in gold, silver, copper and lead. The Cordilleras stand unparalleled in the world for continuity, extent, and variety of their mineral resources. In Canada, and in Alaska, this belt maintains its reputation, although in both for the greater part unprospected. In Canada it has a length of 1300 and a width of 400 miles. It is preeminently a great mining region. . . . The Cordilleran belt in Canada is not only rich in gold, silver, lead, copper and zinc, but has enormous resources of coal of excellent quality, varying from lignite to anthracite, which is conveniently distributed. . . . The prospective resources of the Cordilleran belt in Canada may, therefore, be

> considered enormous. Though mostly unprospected, it has been proved to possess the greatest coal fields, one of the greatest copper mines, one of the greatest lead-silver mines, and two of the greatest placer-gold camps in Western America—a region noted for its extraordinary mineral wealth. . . . In Canada the region includes all of British Columbia, parts of Western Alberta, the whole of Yukon Territory, and a large tract in the adjacent western portion of the North-West Territories—an area, in all, of approximately 600,000 square miles.

In a paper on the 'Mining Possibilities of the Canadian Rockies,'[1] by Bernard MacDonald, read before the Canadian Mining Institute, it is shown that in Mexico the Rocky Mountains had up to 1903 yielded of precious metals alone, over a length of 1700 miles, a total production of $5,500,000,000, or an average of $3,235,294 per mile; in the United States there was a total of $4,500,000,000 or $3,461,538 per mile along a length of 1300 miles; while in Canada the total had reached only $166,000,000, or $103,750 per mile for 1600 miles. MacDonald, in the course of his paper, observed: 'It is fair to assume that the Rockies in Canada will yield a quantity of the precious metals equal to that produced by them in American or Mexican territory —mile for mile of their length—when equally developed.'[2]

Another paper read at the annual meeting of the Canadian Mining Institute in 1903 was one by Frederick Hobart, associate editor of the *Engineering and Mining Journal*, New York, who said, when speaking on 'Some Possibilities of Mining in Canada':

> The iron ores of the Coast districts of British Columbia are still to be developed, but they exist in quantity. The raw material is abundant, and coal and coke are within reasonable distance. . . . On the western coast the establishment of iron manufacture will enable Canada to compete—I believe with success—for the supply of iron and steel to Eastern Asia and probably Australia also; while there is nothing to prevent the

[1] *Journal of the Canadian Mining Institute*, vol. vi., 1903.

[2] It should be kept in mind that much of the northern Cordilleran belt, or Canadian Rocky Mountain region, is in British Columbia.

> capture of the trade of the entire Pacific Coast. British Columbia has the most important supplies of iron ore and the only good coking coal on the coast; advantages which will surely be realized before long.

Much other testimony along similar lines might be adduced.

Immense Mineral Resources

Before narrating the history of mining in the province, the immensity of the mineral resources of British Columbia will be indicated by brief notes concerning two of the various classes of minerals.

In the *Annual Report of the Minister of Mines* for 1902 the provincial mineralogist gives much information relative to the placer gold estimated to be contained in 'the great low-grade gravel deposits, which have received their chief development about Quesnel Forks, Cariboo.' He says, in part:

> Mr John B. Hobson claims for his company that he has leases of 500,000,000 cubic yards of auriferous gravels, and it is quite safe to say that he has not in these leases one-fifth of the available gravels, so that in this section alone there must be from 2,500,000,000 to 3,000,000,000 cubic yards of auriferous gravels, which there is every reason to think will be as rich as the Consolidated Cariboo Company's deposit. The immensity of these figures is hard to grasp, but to illustrate—if ten cubic yards yield $1 in gold, then there is in the Quesnel section alone $300,000,000 worth of gold. This vast amount of gold is so 'diluted' with sand and gravel that the only possible means of extracting it is by the use of immense volumes of water under pressure; in other words, by hydraulic mining.

As to coal—in a paper on 'The Undeveloped Coal Resources of Canada,' presented at the annual meeting of the Canadian Mining Institute in March 1911, D. B. Dowling, of the Geological Survey of Canada, one of the chief authorities on the coal resources of the Dominion, gave information relative to coal in British Columbia, from which the following has been summarized:

COAL AREAS PARTIALLY EXAMINED AND FOR WHICH AN ESTIMATE OF CONTENT MIGHT BE TAKEN AS APPROXIMATE

	Area in sq. miles	Class of Coal		
		Anthracite	Bituminous	Lignite
		millions of tons	millions of tons	millions of tons
Vancouver Island . .	674	...	2,547	...
Queen Charlotte Islands .	160	...	307	256
Mainland of Province .	517	61	36,820	234
Totals . . .	1351	61	39,674	490

The total coal estimated to be contained in 1351 square miles is, therefore, 40,225,000,000 tons. Large additions to the quantity shown in the foregoing estimate may be expected, for there are several fields of which little is yet known.

History of Mining in British Columbia

The first notable event in the history of the mining industry of British Columbia appears to have been the discovery, about the year 1825, by David Douglas (a celebrated botanist who was investigating the flora of the country), of a large outcrop of galena ore near the eastern shore of Kootenay Lake, opposite Hot Springs or Ainsworth, at what is now the Blue Bell mine.

Ten years later, in 1835, coal was first discovered in British Columbia at Fort Rupert, Vancouver Island. The late Dr George M. Dawson, director of the Geological Survey of Canada, in a paper read before the Royal Colonial Institute, observed :

> The existence of coal upon the coast of British Columbia was recognized by Dr W. F. Tolmie, an officer of the Hudson's Bay Company, as early as 1835 ; but though small quantities of coal were actually obtained from natural outcrops from time to time, for the use of the blacksmiths at the company's posts, no importance appears to have been attached to the discovery. The world was at that time very spacious, and the Pacific

> Ocean was still regarded rather as a field for the exploration of navigators than as a highway of commerce between America and Asia. Afterwards (in 1849) the Hudson's Bay Company brought out a few coal miners from Scotland, and proceeded to test and open the deposits.

Again, Dr Dawson, after mentioning the bringing of specimens of coal by Indians, in 1835, to Dr Tolmie, then stationed at the Hudson's Bay Company's post at Fort McLoughlin, Milbank Sound (now Bella Coola), and the exploratory work done at Suquash, between Port McNeill and Beaver Harbour, on the north-east coast of Vancouver Island, in the years 1849-53, states :

> Meanwhile, in 1850, the existence of coal at Nanaimo had been ascertained by Mr J. W. McKay, and in the following year it appears that most of the miners were transferred from the northern end of the island to that place. Work was begun in earnest at Nanaimo in 1852 and, before the close of 1853, 2000 tons of coal are reported to have been shipped, chiefly to San Francisco, California. The price of coal at Nanaimo was at this time $11 and at San Francisco $28 a ton. The Hudson's Bay Company, under the name of the Nanaimo Coal Company, continued to work the mines thus opened until 1861, when they were sold to the Vancouver Coal Mining and Land Company, Limited.[1]

The first authenticated discovery of gold within the limits of what is now the Province of British Columbia occurred at Mitchell or Gold Harbour, on the west coast of the Queen Charlotte Islands. This discovery created considerable interest at the time, but, Dr Dawson wrote, was in no way connected with the Fraser River excitement, and the general commencement of placer-mining which came later. J. W. McKay, who was conversant with all the circumstances at the time, stated that the first gold discovered was a nugget found accidentally by an Indian woman. Part of the nugget, weighing between four and five ounces, was taken by an Indian to Fort Simpson and sold to the

[1] *Mineral Wealth of British Columbia*, 1887, p. 80.

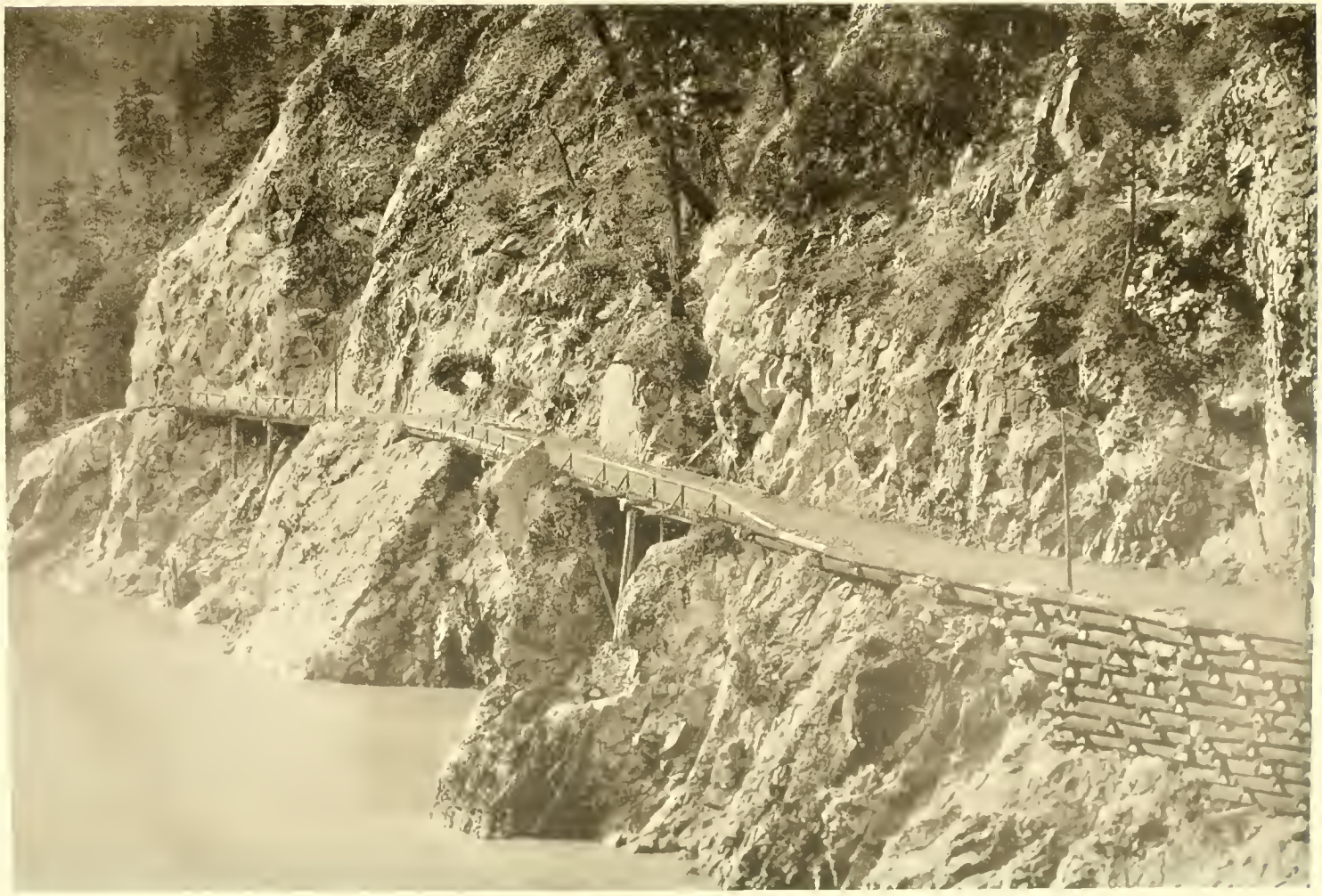
Hudson's Bay official there. John McLellan, of Skidegate, Moresby Island, in a paper contributed to the Canadian Mining Institute, wrote :

> The Gold Harbour area is interesting historically, as one of the first discoveries of gold in British Columbia was made at this place. This was by the Hudson's Bay Company so long ago as 1852, samples of free gold having been brought to them from the islands by Haida Indians. An expedition was organized and proved a profitable venture, but no accurate information as to the amount of gold extracted is now obtainable. Estimates vary from $5000 to a very large amount. At any rate, the ore proved of a 'pockety' character, and the district was soon abandoned. The old workings consist of an open cut some 30 ft. long, close to the water's edge and parallel to the coast line of the harbour. The deepest part is only about 12 ft. from the surface. This work has exposed an irregular quartz vein, almost vertical and varying in width from a mere seam up to 18 in., the vein-filling being a hard milky-white quartz, with a very small proportion of iron and copper pyrites, and containing gold value under $2 per ton. No high grade ore is now visible at this point.[1]

In the interior of the province gold was found in the Similkameen country as early as 1852, while in 1854 Colville (Washington) Indians were known to have nuggets of gold in their possession. Bancroft, in his *History of British Columbia*, states that Chief Trader McLean procured gold from Indians near Kamloops in 1852. Various authorities place the first finds in different localities. However, between 1855 and 1857 discoveries of gold were made on the Thompson, Fraser, and Columbia Rivers, and the news of these, together with dispatches sent to England by Governor Douglas, soon attracted attention to British Columbia as a prospective goldfield. Then came the rush to the Fraser River in 1858.

It is an old story now how people hurried from San Francisco to Victoria by thousands and set up their tents ; how they rushed up the Fraser River, many crossing the Gulf of Georgia in open boats ; how, in coming to British

[1] *Journal of the Canadian Mining Institute*, vol. xiii., 1910, p. 294.



CARIBOO ROAD, FRASER RIVER

Columbia, they crossed the Isthmus of Panama, or rounded Cape Horn, or plodded wearily overland from Eastern Canada or the United States. 'Victoria became a city in a day, and the Mainland solitude was converted into a crown colony in a year.'

Up to 1858 nothing but preliminary work had been done, consequently little was known of the mineral resources of the province. In that year, however, gold-mining was really begun, and from that period dates the history of productive mining in British Columbia. The increase in the production of gold was rapid, and from $705,000, which is a rough estimate of the value of the output in 1858, its value rose year by year until the maximum for any one year was reached in 1863, when the production was valued at $3,913,563. In passing, it may be mentioned that the output for ten years, 1860-69, was of a total recorded value of $28,983,106.

In 1861, after laborious journeyings by daring prospectors, Williams and Lightning Creeks, two of the most noted gold producers of British Columbia, were discovered, and in this and the following year most of the other rich creeks in Cariboo district became known. Then began that second rush which was one of the most notable events in the history of British Columbia, and one that has had most lasting effects in determining its future. The finds of gold were very rich, and the lucky prospectors who became owners of the rich claims amassed large sums of money in a very short time.

Dr Dawson wrote of these creeks :

> Williams Creek has yielded more gold than any other stream in British Columbia. As examples of its yield in early years, Steele's claim gave a maximum yield of 409 oz. or $6544 a day. More than $100,000 in all was taken from this claim of 80 by 25 ft. In 1862 Cunningham's claim produced gold to the value of nearly $2000 a day for the season, while on several days as much as 52 lb. weight of gold was taken out. The Adams claim yielded to each of its three partners $40,000 clear. These claims were above 'the canyon' in shallow ground. The deep ground below 'the canyon' was first bottomed toward the end of 1861 by the Barker Company (whence the name of the town, Barkerville).

The Diller Company was the next successful in this, and it is credibly stated that here, on one occasion, 200 lb. of gold, worth $38,400, was obtained in one day. In 1863 three claims below 'the canyon' yielded $300,000, and 20 claims were steadily producing from 70 to 400 oz. a day. Four hundred miners were at work on Williams Creek in this year—'the Golden Year.' The aggregate value of the yield of Williams Creek for the first seven years of working, for which no returns are available, was very large. In 1861, $200,000 worth of gold was taken from Campbell's Discovery claim and the adjacent Whitehall claim, both on Lightning Creek. Attempts were made almost from the first to reach the deep channel of this creek, but after much work, were abandoned in 1864. However, sinking was resumed in 1870, and having proved successful, led to the subsequent great developments. The rich character of some of the ground may be indicated by stating that at one time the Butcher claim yielded 350 oz. a day, the Aurora 300 to 600 oz, and the Caledonia 300 oz.

Other placer-gold diggings that afterwards contributed appreciably to the production of gold were: Wild Horse Creek, East Kootenay; Granite and Rock Creeks in South-East Yale; Omineca and Cassiar, north and north-west of Cariboo; the Big Bend of the Columbia, north of Revelstoke; and the Atlin field, nearer the coast part of Cassiar district. Between 1873 and 1888 mineral to the value of about $5,000,000 was recovered from gold-bearing streams in Cassiar district, and since the discovery of the Atlin field, in 1898, there has been recovered from this part of Cassiar, to the end of 1912, gold valued at $5,526,000.

Apart from the unimportant beginning in lode-mining made at Gold Harbour, before mentioned, and the work stated to have been done by an Australian miner named Waddington, who in 1862-63 sank a shaft to a depth of about 130 feet on a small vein of copper ore occurring at what is now known as 'Old Shaft'—situated near Skidegate, Moresby Island—it is probable this industry was commenced at the Blue Bell mine, Kootenay Lake. Several years ago A. D. Wheeler, of Ainsworth, stated that

late in the twenties Hudson's Bay Company trappers

> used ore from the Blue Bell outcrops for making bullets, and on their departure left several old drills behind. For about twenty-five years no one appears to have visited the place or communicated to the world anything concerning it. About 1864, Mr (afterward Senator) George Hearst, of California, a wealthy mining man, having received favourable reports from prospectors he had sent north, made a trip to the property. He encountered much hardship by the way, but persisted, and on reaching the place erected a small open-hearth furnace and smelted out some bullion. The remains of that old furnace still exist on the property. The low grade of the bullion, the distance from transportation, and the supposed inability to market the product within his lifetime, decided Mr Hearst on abandoning his project. About 1887 Dr W. A. Hendryx, with a party of Minnesota and Connecticut capitalists, obtained possession of the property. . . . Steam power was in use at the Blue Bell mine in 1889, and in 1891 the construction of smelting works at Pilot Bay, Kootenay Lake, was commenced. It was not until 1894 or 1895, however, that smelting was actually done at these works.

In the late seventies and the eighties occurrences of various ores in different parts of the province were known, and prospecting was done to develop some of them. Among these were copper-silver on Howe Sound, silver near Yale, gold at Lillooet, copper-silver in Nicola district, gold-quartz in Cariboo, silver-lead at Illecillewaet, galena at Hot Springs (Ainsworth), and copper-silver near Nelson.

The first production and shipment of ore in quantity appears to have been made by the Selkirk Mining and Smelting Company, which in 1887 and 1888 shipped to a smeltery in San Francisco, California, 422 tons of sorted silver-lead ore from the Lanark mine, Illecillewaet, where a small crushing and sampling mill had previously been put in. In 1889 the Ainsworth mines shipped 357 tons of silver-lead ore, and the Silver King, on Toad Mountain, near Nelson, 70 tons of copper-silver ore. Meanwhile, development of the Blue Bell mine (acquired, as mentioned above, by American capitalists who afterward organized the Kootenay Mining and Smelting Company) had been com-

menced, and later—1894-95—a smeltery was established at Pilot Bay, eight or nine miles from the mine, to smelt ore from the Blue Bell, which in 1895 shipped to it about 52,000 tons. But the first smelting works completed in the province was that of the Kootenay Smelting and Trading Company, near Revelstoke, in the year 1889.

In its *Report on the Mining and Metallurgical Industries*, 1907-8, the Dominion department of Mines includes the following in its ' Genesis of Lode Mining ' :

> The first production of copper was made in 1888-89, from the Hall Mines (Silver King), near Nelson, the value of the product—which consisted of a consignment of 100 tons—having been extraordinarily high, the ore containing from 220·5 oz. silver per ton and 17 per cent copper to 574 oz. silver per ton and 43·36 per cent copper. A small shipment of copper ore—10 tons—was also made from Rossland, in 1891, followed by 700 tons in 1893 ; but regular production was not commenced until 1894. Meanwhile, it is interesting to note, in connexion with Rossland's first production of ore, that the exceptionally high smeltery returns of $84 per ton—or 5·21 per cent copper, 3 oz. silver per ton and about 4 oz. gold —were responsible for bringing about the first important investment of capital in the camp.

Summarizing briefly the beginnings of other lode-mining camps and reduction works, the following includes most of the more important of them : gold-milling was commenced in a small way at Richfield, Cariboo, in 1876 ; gold claims were staked at Camp McKinney,[1] in the Boundary district, in 1884, but ten years elapsed before a stamp-mill was erected there ; many locations of mineral claims were made in the Boundary district between 1886 and 1891, and in 1899-1901 two copper-smelting works were established ; on Trail Creek numerous mineral claims were staked in 1889 and 1890, and in October 1895 construction work on a smelting works was commenced, the first furnace having been fired in February 1896 ; the first smeltery operated in the Coast district was that at Van Anda, Texada Island, built in 1898 ; in 1902 blast

[1] The Cariboo-McKinney mine was closed in 1903, after the company owning it had paid about $547,000 in dividends.

furnaces were blown in at smelteries at Boundary Falls in the Boundary district, and at Ladysmith and Crofton on Vancouver Island. In this last-mentioned year the erection of a smeltery was commenced at Marysville, East Kootenay, but ores were not smelted there until early in 1905.

Other notes in connection with the foregoing are as follows: in 1890 some 1200 tons of gold-bearing quartz was crushed at the Poorman ten-stamp mill, near Nelson, West Kootenay; many silver and silver-lead claims were located in Slocan district in 1890-91, and in 1892 the shipment of ore was commenced; the Strathyre stamp-mill was built at Fairview, Okanagan district, in 1893; in 1894 a concentrating plant was put in at the No. 1 mine, Ainsworth Camp, and another at Alamo, Slocan, on the Nakusp-Sandon branch of the Canadian Pacific Railway; the North Star, located in 1892, was the pioneer ore-producing mine in East Kootenay —it made an experimental shipment of about fifty tons of ore in 1895, and since then its aggregate of shipments has reached to about 80,000 tons; the St Eugene, also in East Kootenay, which was afterwards developed into the biggest lead-mine in Canada and has produced more than 1,000,000 tons of ore, was staked in 1893; the Ymir gold-mine was developed in the late nineties, and in 1900 the number of stamps in its mill was increased to eighty, making it the largest stamp-mill in the province. Other important mines are: the Nickel Plate near Hedley, Similkameen, with a forty-stamp mill and cyanide plant; the Britannia, at Howe Sound near the city of Vancouver, with the largest concentrating plant in British Columbia; the Van Anda group and Marble Bay copper-mines on Texada Island; the Tyee and Lenora on Mt Sicker, Vancouver Island; and the Hidden Creek group on Observatory Inlet, on which the Granby Consolidated Company had, by the close of 1913, developed 8,000,000 tons of copper ore.

Mineral Production

In order of relative importance, the chief minerals of British Columbia are gold (placer and lode), coal, copper,

silver, and lead. Neither iron nor zinc has yet been produced in any considerable quantity, though both occur in numerous places in the province.

The respective totals of value of the various minerals produced are shown in the first of the following tables, which exhibits the aggregate value of mineral production for all years to 1912 inclusive; the second table shows periodic increases:

PRODUCTION BY MINERALS

Gold, placer		$72,194,603
Gold, lode		70,859,022
Total gold		$143,053,625
Silver		33,863,940
Lead		27,520,753
Copper		73,723,562
Iron, zinc, etc.		1,528,403
Total metallic		$279,690,283
Coal	$118,687,488	
Coke	14,183,667	
Total coal and coke	$132,871,155	
Building stone, brick, cement, etc.	17,576,084	
Total non-metallic		150,447,239
Total value of mineral production		$430,137,522

PRODUCTION BY PERIODS

For all years to 1892 inclusive		$ 81,090,069
„ five years, 1893-1897	$ 31,420,396	
„ „ „ 1898-1902	77,218,073	
„ ten „ 1893-1902		108,638,469
„ five „ 1903-1907	$109,797,744	
„ „ „ 1908-1912	130,611,240	
„ ten „ 1903-1912		240,408,984
Aggregate value of production		$430,137,522

It will be seen that the increase in value of production

for the ten-year period 1903-12, as compared with that of 1893-1902, was nearly 140 per cent, and that nearly fifty-six per cent of the whole production was made in the last ten years.

Placer Gold

The commencement of production of placer (or alluvial) gold dates back to 1858, for which year a yield valued at $705,000 is on official record. The maximum production of any one year was that of 1863, with a recorded value of $3,913,563, followed in 1864 by a total of $3,735,850, and in 1865 by $3,491,205. The only other year in which production exceeded $3,000,000 in value was in 1868, when it was $3,372,972. Placer-gold mining was at its best during the period 1860-68; thereafter the value of the production of any single year only once exceeded a total of $2,000,000, and that was in 1875, when Cassiar district contributed substantially to the total yield. The decrease was gradual until the early eighties, and after that rapid until, in 1893, the minimum total of production in any year during the history of placer-gold mining in the province was reached, with an output for that year of only $356,131. Thenceforward there was a steady increase for half a dozen years, to which Atlin district contributed materially in 1899. Production was fairly well maintained until 1905; then followed a decreasing annual yield, but present prospects are that improvement will be experienced.

During the years 1858 to 1912 inclusive the aggregate value of the placer gold recovered is stated in the official records to have been $72,194,603; the production in short periods is shown in the next table:

For five years, 1858-1862	$ 9,871,634
,, ten ,, 1863-1872	26,178,910
,, ,, ,, 1873-1882	14,599,112
,, ,, ,, 1883-1892	6,366,941
,, ,, ,, 1893-1902	7,611,086
,, ,, ,, 1903-1912	7,566,920
Aggregate value of placer gold	$72,194,603

Lode Metals

While there was only a small production of lode metals during the seven years prior to 1894, it appears probable that it was somewhat larger than is shown in the official tables. However, taking the official figures, it is found that a commencement was made in 1887, in which year silver and lead to a total value of $26,547 were produced. The first official record of lode-gold production was of a value of $23,404 for the year 1893, and of copper $16,234 for 1894. As better showing the production of minerals, quantities rather than the recorded value will be given for the remaining minerals to be dealt with, for value was affected by fluctuations in prices of silver, lead, and copper, and in less degree of coal and coke. It may be mentioned here that a strike of coal-mine employees, which lasted nearly eight months in 1911, by interfering with the supply of coal and coke seriously affected production of all the lode minerals and coal and coke to an estimated total value of between $4,000,000 and $5,000,000, so that the production of these several minerals for the last ten-year period shows less favourably by that amount than would otherwise have been the case.

Gold.—As the first production of lode gold included in the official records was for the year 1893, it follows that this metal has been produced over a period of twenty years. The aggregate quantity produced to the end of 1912 was 3,438,849 oz. Of this total, approximately 2,022,000 oz. came from Rossland (Trail Creek division) mines, 985,000 oz. from Boundary district mines (including Similkameen district), 303,000 oz. from mines in Nelson mining division, 97,000 oz. from mines in the Coast district, and 32,000 oz. from other parts of the province. It should be noted that a considerable proportion of the lode gold produced is obtained from smelting copper-bearing ores. In 1912 the percentage from such ores was placed at about seventy-five per cent, while in some years it has been greater. The remainder is from ores treated in stamp-mills, some of which have auxiliary cyanide plants.

Comparing periods, the production of lode gold was as under :

	oz.
For five years, 1893-1897	215,086
,, ,, ,, 1898-1902	862,404
,, ,, ,, 1903-1907	1,113,739
,, ,, ,, 1908-1912	1,247,620
Aggregate quantity of lode gold . . .	3,438,849

The largest quantity of lode gold produced in any year was in 1910, with an output of 267,701 oz. (fine).

Silver.—The maximum yearly production of silver was in 1897, with an output of 5,472,971 oz., followed by 4,292,401 oz. in 1898. With the exception of 1901, when the output was 5,151,333 oz., all other years have had a production of less than 4,000,000 oz. That for 1911, of only 1,892,364 oz., was the smallest since 1895, but conditions were exceptionally unfavourable, forest fires having destroyed mine surface works, concentrating mills, and several miles of the Slocan railway, which is in the chief silver-lead producing district in the province. These preventive causes were remedied, and in 1912 the output increased to 3,132,108 oz.

The aggregate quantity of silver produced in all years to the end of 1912 was 59,672,859 oz. The proportions obtained from the various districts are as follows : Slocan, 33,770,581 oz.; East Kootenay, 8,418,119 oz.; Nelson, 5,501,221 oz.; Boundary, 5,042,132 oz.; Rossland, 3,381,892 oz.; Lardeau, 2,216,854 oz.; and Coast, 1,342,060 oz. The silver from Boundary and Rossland mines, like the gold, comes almost altogether from copper-bearing ores ; to a considerable degree silver obtained in the Coast district is similarly associated with copper, but the outlook is that in the future a fair proportion will come from lead-bearing ores. It will be seen that more than half of the silver produced has come from Slocan district (which includes Ainsworth division), in which much of the ore has a comparatively high silver content. A comparison of production by periods is made in the following table :

		oz.
For six years,	1887-1892	302,749
,, five ,,	1893-1897	11,078,215
,, ,, ,,	1898-1902	20,259,239
,, ,, ,,	1903-1907	15,393,812
,, ,, ,,	1908-1912	12,638,844
Aggregate quantity of silver produced		59,672,859

Lead.—The records show a total of approximately 342,829 tons (of 2000 lb.) of lead produced. As with silver, the output was small during the earlier years of production—less than 10,000,000 lb. in eight years to the end of 1894; in fact, less than 2,000,000 lb. was produced in the six years 1887-92. The maximum output for one year was that for 1900—63,358,621 lb.; the minimum since 1895 was that for 1903, when only 18,089,283 lb. were produced. There had been a decreasing annual production since 1905, from 56,580,703 lb. in that year to 26,872,397 lb. in 1911. Conditions were temporarily unfavourable in the last-mentioned year, partly from the same causes as affected the production of silver. A decided improvement was noticeable in 1912, when the output was increased to 44,871,454 lb.

The proportions of the aggregate output of 685,658,671 lb. of lead obtained from the various districts in which ore containing this metal is mined are as follows: from East Kootenay, 354,959,347 lb.; Slocan, 299,684,211 lb.; Nelson, 19,168,072 lb.; Lardeau, 10,519,414 lb.; other parts, 1,327,627 lb.

By short periods the output was as under:

		lb.
For six years,	1887-1892	1,852,820
,, five ,,	1893-1897	87,314,122
,, ,, ,,	1898-1902	191,033,903
,, ,, ,,	1903-1907	211,463,150
,, ,, ,,	1908-1912	193,994,676
Aggregate quantity of lead produced		685,658,671

Practically all the lead produced in Canada in recent years has come from British Columbia mines. The Dominion government pays a bounty of seventy-five cents per hundred pounds of lead contained in lead-bearing ores mined and

smelted in Canada. When the standard price of pig-lead in London, England, exceeds £14, 10s. sterling per ton of 2240 lb., the bounty is reduced by such excess until, at £18 per ton, it ceases to be paid. This assistance to lead-miners has been given for ten years, in two five-year periods, the second of which expired on June 30, 1913. The total amount voted for such bounty payment was $2,500,000. To the end of March 1910, $1,471,819 had been paid. Exact figures to date are not to hand, but since payments for the calendar years 1910 and 1911 were $219,558 and $318,308 respectively, nearly $2,000,000 in all had been paid up to the end of the latter year. An appropriation of $50,000 for experiments in reduction of lead-zinc ores was authorized in 1910, this amount to be deducted from the lead-bounty vote.

Copper.—According to official records the production of copper was commenced in 1894, in which year there was an output of 324,680 lb. This was probably from the Silver King mine near Nelson. Thereafter production increased yearly, until in 1900, the first year in which copper ore was smelted in the Boundary district, the total was 9,997,000 lb.—from mines in the Boundary district 5,672,000 lb., in the Coast district 2,194,000 lb., in the Rossland camp 2,072,000 lb., and in other parts 59,000 lb. The average yearly production for five years, 1908-12, was 43,899,997 lb. A record was made in 1912, when 51,456,537 lb. were produced. The aggregate of production to the end of 1912 was 503,737,902 lb.; the proportions of the several districts were: Boundary, 334,946,577 lb.; Trail Creek (Rossland), 86,741,841 lb.; Coast, 66,992,753 lb.; Nelson, 13,389,378 lb.; other parts, 1,687,353 lb.

The considerable increase in the production of copper during the nineteen years 1894-1912 is shown in the following comparative table:

	lb.
For four years, 1894-1897 . . .	10,421,256
„ five „ 1898-1902 . . .	82,231,152
„ „ „ 1903-1907 . . .	191,585,508
„ „ „ 1908-1912 . . .	219,499,986
Aggregate quantity of copper produced .	503,737,902

Other Metals.—The production of other metals than the foregoing, placed at an approximate total value for all years of $1,528,403, may be subdivided as follows: zinc, $1,413,403; iron, $105,000; platinum, $10,000. It is probable the last-mentioned amount is inadequate, for one unofficial estimate, likely to be approximately correct, places the quantity of platinum (placer) recovered in Tulameen district at 20,000 oz., but the quantity reported to the provincial department of Mines was very much smaller.

Value of Lode Metals.—The aggregate value of the lode metals produced, leaving out of account zinc and iron, appears in the official records covering a period of twenty-six years as having been $205,967,277. The proportion for short periods is as under:

For six years,	1887-1892	$ 363,678
,, five ,,	1893-1897	14,730,749
,, ,, ,,	1898-1902	48,134,927
,, ,, ,,	1903-1907	72,761,515
,, ,, ,,	1908-1912	69,976,408
Aggregate value		$205,967,277

Coal and Coke

Coal.—The production of coal appears to have been commenced in 1836, official records including that year. The output during the first half-century of production, however, was small, for the records show an aggregate for fifty years, 1836-85, of only 3,029,011 tons (2240 lb.), which was less than the production of a single recent year (in 1910 there was a total output of 3,139,235 tons gross). It was not until 1891 that a year's output exceeded 1,000,000 tons—in that year it was 1,029,097 tons, in 1894 it was 1,012,953 tons, but for other years prior to 1898 the quantity produced in each was less than 1,000,000 tons. Since 1898 a higher annual output has been maintained, and in 1910 a maximum quantity, as stated above, was reached.

The next table will serve to show the advances made in

the production of coal. All the quantities given are for net coal, and do not include the coal made into coke :

		Tons of 2240 lb.
For all years to 1882 inclusive . . .		2,156,046
,, five years, 1883-1887 .	1,612,961	
,, ,, ,, 1888-1892 .	3,602,703	
,, ten ,, 1883-1892 . . .		5,215,664
,, five ,, 1893-1897 .	4,709,977	
,, ,, ,, 1898-1902 .	6,739,509	
,, ten ,, 1893-1902 . . .		11,449,486
,, five ,, 1903-1907 .	7,123,504	
,, ,, ,, 1908-1912 .	11,306,237	
,, ten ,, 1903-1912 . . .		18,429,741
Aggregate quantity of coal (net tons) . .		37,250,937

Prior to 1898 all coal produced in the province came from mines on Vancouver Island ; since then there has been a steadily increasing output from mines in Crowsnest district, South-East Kootenay, and quite recently a small production from Nicola valley and Princeton.

Coke.—The manufacture of coke was commenced in 1895 at Union Bay, Vancouver Island : in three years, 1895-97, 19,396 long tons were made. In 1898 the Crow's Nest Pass Coal Company made its first coke—only 361 tons—and in the next year increased its output to nearly 30,000 tons. Very little coke has been made on Vancouver Island of late years, but in Crowsnest district as much as 271,785 tons have been made in one year.

By periods the output has been as under :

	Tons of 2240 lb.
For three years, 1895-1897 . . .	19,396
,, five ,, 1898-1902 . . .	409,496
,, ,, ,, 1903-1907 . . .	1,097,896
,, ,, ,, 1908-1912 . . .	1,054,469
Aggregate quantity	2,581,257

Owing to a strike, which lasted nearly eight months, of men employed at the coal-mines and coke-ovens in Crowsnest

district, the production of coal and coke in 1911 was only about one-third of the quantity produced under normal conditions.

Miscellaneous Minerals

Miscellaneous minerals occurring in the province include platinum, chiefly in the Tulameen district; cinnabar (mercury), near Kamloops and on the west coast of Vancouver Island; pyrites, in lower Skeena country; scheelite (calcium tungstate), in Cariboo district; tungsten, at Sheep Creek, Nelson mining division; molybdenum, in Nicola district and various other parts; mica, at Tête Jaune Cache, upper Fraser River; hydro-magnesite, at Atlin; gypsum, in Ashcroft mining division and Nicola valley; and clays, building and other stones, cement materials, limestone, sand, etc., all of more or less commercial value, and available for utilization and contributing to the total value of the mineral production of British Columbia.

While few of these non-metallic minerals, except those used as building materials or for other construction work, are produced in commercial quantity, no doubt others of them will also be turned to profitable account in due course. The increasing importance of miscellaneous products is, however, indicated by official statistics, which show that while the estimated value of these was $1,200,000 in 1909, there was an increase to $3,547,262 in 1911, this total including $1,419,000 for building stone, $650,000 for Portland cement, and $405,100 for red brick. The utilization of the building materials occurring in large quantity and variety will, of course, be on a much larger scale as the province develops and bigger towns and cities are established. There is an abundance of granite, sandstone, limestone, and other stones suitable for building purposes, much of it near navigable waterways and consequently easily accessible. Marble also occurs, both on the coast and in the interior, while the existence of comparatively important cement manufactories, lime-kilns, brick and pottery works, and other industrial establishments in which non-metallic minerals are prepared

for use, is convincing evidence of the possession of much raw material suitable for building and other construction purposes.

A Striking Comparison

It is of interest to note that British Columbia continues to maintain its position, held for many years, as a large contributor to the mineral production of Canada as a whole. Taking the aggregate value of the production of the Dominion for the twenty-seven years, 1886-1912, included in the published official records, at $1,371,502,000, it would appear that this province may fairly claim to have produced between twenty-six and twenty-seven per cent of this large sum. The aggregate value of the mineral production of the province for all years to 1912 inclusive is $430,137,000. Deducting the total value of the minerals—chiefly for coal and placer gold—produced prior to 1886, which was nearly $64,000,000, British Columbia's approximate aggregate for the last twenty-seven years is left at $366,137,000, which is between twenty-six and twenty-seven per cent of that of the whole of Canada. It is a striking fact, as indicating the substantial increase in the value of the mineral production of the province in recent years as compared with that of from ten to twenty years ago, that thirty-six per cent of this large value is the production of the last five years, while about one-half is that of seven years, 1906-12.

Some of the Larger Mines

A complete list of the productive mines of the province would be a long one; only a few of the larger ones will be mentioned.

In Cariboo District.—About Barkerville John Hopp continues to operate on a comparatively large scale several important placer-gold mines on the well-known Williams Creek and some of its tributary creeks. These are the Mucho Oro, Forest Rose, Lowhee, and Mosquito Creek hydraulic mines —all productive, and giving promise of continuing to yield much gold for years. In Quesnel division John B. Hobson

recovered more than $1,000,000 worth of gold from between ten and eleven million cubic yards of gravel he washed on leases then held by the Consolidated Cariboo Company. In 1911 the Quesnelle Hydraulic Gold Mining Company completed its water-supply system and hydraulicking equipment at a cost of about $1,000,000, for operating a large placer mine.

In East Kootenay.—Coal, lead, and silver mines are most important in this district. The Crow's Nest Pass Coal Company has three collieries equipped for a gross production of at least 5000 tons of coal a day and much coke. The Hosmer Mines, Limited, also has a well-equipped colliery, with coke-ovens. The Corbin Coal and Coke Company has opened a mass of coal of phenomenally large size—as much as three hundred feet in width underground, and of still greater dimensions at the surface, where it is being mined with a steam-shovel. The St Eugene mine, to June 30, 1912, had produced 1,015,280 tons of ore, from which had been made 190,121 tons of concentrate containing 5,319,150 oz. of silver and 227,614,836 lb. of lead ; the Sullivan, owned by the Consolidated Mining and Smelting Company of Canada, Limited, of more recent productive operation, is expected to produce still more largely.

In West Kootenay.—Ainsworth division has a large mine in the Blue Bell, besides many others having smaller but richer ore bodies. In 1912 there was much activity in Ainsworth camp, after several years of comparatively small production.

Slocan division is big with promise. The Lucky Jim is stated to have much zinc ore ready for shipment. The Rambler-Cariboo has large shoots of high-grade silver-lead ore opened at various levels between 700 and 1400 feet depth. The Payne, from which in past years fully 50,000 tons of silver-lead-zinc ore and concentrate was shipped to smelteries, and which paid more than $1,400,000 in dividends, is now being opened at considerable depth below the lowest level worked in past years. The Slocan Star, also, has big ore shoots at depth. The Standard is shipping much ore and concentrate and distributing among its shareholders profits

to the amount of $50,000 monthly. A dozen other mines in Slocan district are looking well for an early resumption of production with profitable results.

In Nelson division several gold-quartz mines are together yielding much gold—the Granite-Poorman, Queen, Mother Lode, and others. In the vicinity of the old Ymir gold-mine, which was a large producer in earlier years, much development of promising properties is being done. The Emerald lead-mine has been a regular shipper for several years. The old Silver King, known to have good ore in its lower levels, is being worked again, and is regularly making an output.

Rossland mines have produced ore of a total gross value of more than $55,000,000. The Le Roi, Le Roi No. 2, and Centre Star group continue to yield freely. Figures of total production of the other mines are not available, but approximate figures for the Centre Star are 2,034,000 tons of ore containing 1,016,000 oz. of gold, 1,019,000 oz. of silver, and 34,261,000 lb. of copper, having a gross value of about $26,490,000. The value of metals produced at the smeltery at Trail in all years is now (1913) about $60,503,000.

In Boundary District.—Boundary district mines produce the greater part of the yearly output of ore in the province. The Granby Company's mines at Phoenix have sent about 9,236,000 tons of ore to the company's smelting works. The British Columbia Copper Company's Mother Lode mine has a record to date of nearly 3,000,000 tons shipped, while other mines which this company operates have also sent out much ore. Mining and smelting costs of both companies are unusually low.

In Similkameen District.—The Hedley Gold Mining Company's Nickel Plate group of mines is a comparatively large producer of lode gold. Production is now at the rate of fully 70,000 tons of ore per annum, from which gold to the average value of between $11 and $12 a ton is recovered at a total cost of a little more than $5 a ton, leaving more than one-half net profit. In 1911 and in 1912 the company paid dividends equal to thirty per cent on its issued capital of $1,200,000. At Nicola there are productive coal-mines.

In Coast District.—On the mainland coast the largest

metal mines are the Britannia, near Vancouver, and the Granby Company's Hidden Creek mines, near Observatory Inlet. In the former large bodies of copper ore have been opened, and the 1912 output of copper was more than 14,000,000 lb. The Granby Company has had reports from five or six engineers, and their estimates of workable ore in the Hidden Creek mines range from 5,000,000 to 12,000,000 tons. The company's expenditure on mines, smelting works, etc., to the end of 1913 was about $3,000,000.

On Vancouver Island the Tyee and Lenora mines on Mt Sicker yielded fully $2,500,000 worth of ore. Large collieries are being operated at Nanaimo, Extension, Comox, and other places. The Canadian Collieries (Dunsmuir) Limited at the close of 1913 had spent $2,000,000 in developing mines, establishing a hydro-electric power generating station, railway connections, etc.

The above-mentioned are among the larger and best-known mines in the province, but, as already indicated, there are many more being worked, and a considerable number contribute to its annual mineral production.

Mining Methods and Metallurgical Facilities

Mining methods in use in British Columbia vary according to local conditions and circumstances.

In placer-gold mining, hydraulicking has largely superseded working by individual miners using rockers, small sluices, etc.

In lode-mining, methods are generally much as in other mining countries where ordinary conditions prevail. The higher-grade metalliferous mines are usually worked with the square-set system of timbering, but the big low-grade copper-mines of the Boundary district, and one or two in other parts of the province, have been operated by the 'glory-hole' or open quarry method. Some of these larger mines are worked even underground with but little timbering, the country rock standing without much support.

In regard to cost of labour and mining requisites, this is

much as elsewhere on the North American continent, except that in some districts freight charges are higher owing to either greater distance from a base of supplies, or to absence of railway competition. Generally, relations between the miners and their employers are amicable; consequently mining is usually continued uninterruptedly.

Smelting Facilities.—Copper-smelting is the chief metallurgical industry. The Granby Consolidated Mining, Smelting and Power Company's smelting works at Grand Forks is stated to be the largest copper reduction works in the British Empire; its treatment capacity is 3700 to 4000 tons of ore a day. Its copper converters are equal to producing 36,000,000 lb. of blister copper per annum.

The British Columbia Copper Company's smeltery at Greenwood, also in the Boundary district, has a maximum treatment capacity of 2600 tons of ore per diem, and an average of more than 2000 tons. The plant here is quite modern: it includes three blast furnaces and two converter stands with horizontal shells, these taking matte at from forty-five to fifty-five per cent copper tenor and producing blister copper 99·3 per cent pure.

The Consolidated Mining and Smelting Company of Canada, Limited, operates on the largest scale of all the mining and smelting companies in the province. It has at Trail, West Kootenay, five copper blast furnaces and two lead stacks. In the company's lead refinery the Betts electrolytic process has long been successfully used. The capacity of the refinery is from sixty to seventy tons of lead a day. The refined lead is 999 fine, and the gold and silver, also refined from the lead bullion, are 995 and 999 fine respectively. The company employs between 500 and 600 men at its Trail works.

Power for all three smelteries above mentioned is obtained from the West Kootenay Power and Light Company's two hydro-electric generating stations at Bonnington Falls, on Kootenay River, eleven miles west of Nelson. This company also has another plant at Cascade Falls, Kettle River, in the Boundary district. The generating capacity of the three plants is between 25,000 and 30,000 horse-

power. High-voltage transmission lines connect with Boundary mines, smelting works, and mills, along a distance of ninety miles, besides which there are lower-voltage lines to Nelson, Trail, and Rossland.

There are other smelteries—copper, lead, and electrothermic zinc—in the province.

Stamp-mills and Concentrating Plants.—Stamp-mills, mostly for crushing gold-quartz ores, have been erected and equipped in various parts of the province. Some of these have auxiliary cyanide plants and other gold-saving appliances.

Concentrating mills, nearly all equipped for concentrating silver-lead and lead-zinc ores, are in use in several districts. Others, for treating copper ores, are at Rossland and Britannia Beach.

Department of Mines

Sir Richard McBride, premier, is also minister of Mines. The chief officials of the department are : deputy minister, R. F. Tolmie ; provincial mineralogist and assayer, William Fleet Robertson; assistant provincial assayer, D. E. Whittaker; chief inspector of mines, Thomas Graham.

The annual reports of the minister of Mines contain a large amount of information relative to the mining industry of the province, and constitute a valuable record of mining, milling, and smelting operations ; of progress made, and of the condition, generally, of the industry.

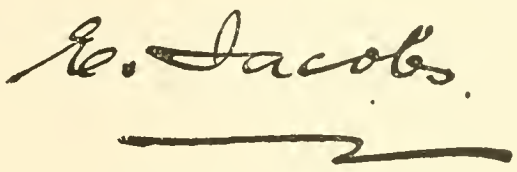
The provincial assay office renders much useful service to the province. Apart from ordinary custom assaying, and gold melting, numerous free qualitative determinations are made of rocks and minerals sent in for identification and classification.

The provincial mineral museum contains examples of the economic ores and minerals of British Columbia, a general collection of minerals from various countries, and an educative collection of typical rocks properly grouped.

Mining Laws

A well-known writer has observed :

> The mining laws of British Columbia are regarded as wise and liberal, and peculiarly adapted to the circumstances of the mining industry. . . . The laws and regulations governing mining, and the policy of the provincial department of Mines, have become fixed and settled, and operators and miners are working out their respective careers under a code the provisions of which are well known and firmly established. There is a very strong disinclination on the part of the government and the legislature to disturb or alter the present satisfactory condition of affairs.
>
> It is authoritatively claimed that the laws regulating the working of coal-mines are as nearly perfect as it is practicable to make them. The department of Mines in recent years gave special attention to these, and its officials spent many months ascertaining the views of both operators and miners before submitting the existing act to the legislative assembly for adoption. Among other modern provisions is one making compulsory the provision of mine-rescue apparatus at all operating coal-mines, at most of which a number of men have taken courses in first-aid and mine-rescue work.



THE YUKON TERRITORY

THE YUKON TERRITORY

Position and Extent

THE Yukon Territory is in the extreme north-western part of the Dominion of Canada. It lies between north latitudes 60° and 69° 40′ and between west longitudes 124° 20′ and 141°, forming a roughly triangular area with a greatest length in a north-westerly and south-easterly direction of eight hundred miles, a greatest width at right angles to the above direction of four hundred miles. It has a total area of 207,000 square miles. It is thus equal in size to France or the German Empire, considerably larger than Spain, and more than twice the size of Great Britain.

Lying as it does on the north-western side of America, the territory occupies a position very similar to Norway and Sweden, or perhaps rather to North-Western Russia, on the western side of Europe.

It is bounded on the south by the northern boundary of the Province of British Columbia and for a short distance by the territory of Alaska, on the west by the territory of Alaska belonging to the United States of America, on the north by the Arctic Ocean, and on the east and north-east by the western boundary of the North-West Territories of Canada.

Topography

Across the south-western portion of the territory runs a range, or rather a series of ranges, of lofty snow-capped mountains which extend parallel to the Pacific coast and culminate towards the west and north-west in the St Elias Alps, among which are some of the highest and grandest mountain peaks in North America. This mountain range, known as the Pacific Mountain Range or System, rises steeply

from the shores of the Pacific Ocean, and within a few miles forms a watershed between the short torrential streams that flow into that ocean and the streams that flow northward across the great interior plateau to join together into the Yukon River and finally to empty into Bering Sea.

These mountains have a roughly serrated outline with peaks rising from six thousand to nineteen thousand five hundred feet above the sea. In many of the intervening valleys rest great glaciers, which often unite around the projecting peaks to form vast fields of snow and ice.

From the crest of the mountain range the country descends north-eastward to the Yukon plateau, which is a great tableland with a width of from two hundred and fifty to three hundred miles and a mean elevation of about two thousand five hundred feet above the sea, drained northward by several streams, among which the Yukon River is the largest and most important.

Towards the east the Yukon plateau is bounded by a series of ranges of mountains, which in a general way may be regarded as the northern continuation of the Rocky Mountains farther south. In their more northern extension these mountains form a moderately well-defined individual range, but towards the south they break into several ranges, with a combined width of from fifty to two hundred miles, separated by great intervening valleys. These mountains have been but little explored, though several parties of hunters and scientific men have travelled over and crossed them.

The Yukon plateau is the most habitable and probably the most valuable and important part of the territory, and almost all the population is confined to it. It lies between the Pacific and Rocky Mountain ranges. It is not by any means a level plain, but rather a wide-spreading area of high, rounded hills with a relief of from two to three thousand feet, the summits being roughly at the same general elevation. As seen from any of the summits the country stretches away in numberless billowy hills, crest beyond crest, as far as the eye can reach, or until the view is cut off by the higher and more rugged peaks of either the Pacific Mountain Range or

the Rocky Mountains. The hills have no kind of definite linear arrangement. They present the characteristics of having been moulded into their present shapes by atmospheric denudation and stream erosion from a pre-existing peneplain, though this peneplain itself, having been underlain by rocks of very different degrees of hardness, may have had a somewhat irregular surface. Remnants of this peneplain can be seen on the tops of the hills and on the crests of the ridges at an average elevation of from four thousand to five thousand feet above the sea, while some of the higher mountains, like Mount Maloney on Nisling River, and the Dome at the head of Hunker Creek, rise above it. Wide valleys traverse the plateau from side to side, or from end to end ; deep lateral valleys join these main arteries ; while harder and more resistant areas have formed central masses from which smaller valleys radiate in all directions to join the large main arteries.

One of these main valleys extends from the head of Lynn Canal, up Chilkat River, across the summit of the Chilkat Mountains at an approximate elevation of two thousand six hundred feet, down the Alsek River, up Klukshu River to Klukshu Lake, across a low plain to Dezadeash Lake, down Kaskawulsh River to Aishihik River, up Aishihik River, past Aishihik Lake, across a swampy flat to Nisling River, down Nisling River to White River, and down White River to the Yukon River. Perhaps it is a continuation of the same great valley in which the Yukon River flows just above Dawson, and which at Dawson continues eastward up what is now the valley of Klondike River. Below the town of Dawson the Yukon flows in a narrower valley to the mouth of Fortymile River, and then turns eastward into the mountains, while the main valley continues up Fortymile River. In fact, it would appear that the Yukon valley for fifty miles below Dawson is the lower part of the original Fortymile valley, and that it joins the Yukon-Klondike valley at Dawson. Many other large valleys also traverse the country.

The region would appear to have been unequally depressed and elevated since these great valleys were originally formed

or outlined. Consequently the large streams do not necessarily follow the valleys continuously, but, as is the case with the Yukon River near Dawson, often cut across from one into another.

The direction in which the water flowed in many of these old valleys when they were the main arteries for the drainage of the whole country is as yet uncertain, but it would seem not improbable that it was generally towards the Pacific Ocean and that the old valleys are genetically connected with the deep fiords which indent the coast, the flow of water southward having been broken and stopped by the geologically late elevation of the Pacific Mountain Range, which elevation gave the whole land a gentle slope towards the north.

Among the smaller areas with radiating drainage none are of greater interest, or are better known, than the Klondike gold-bearing district, in which the valleys diverge outwards in all directions from a high central point, known as the Dome, and finally open into the Klondike valley on the one side, or into the Yukon valley on the other.

The Yukon plateau may be divided into two great subdivisions by a line roughly parallel with the trend of the Chilkat Mountains, marking the northern limit to which the country was generally glaciated during the Glacial period. North of this line the drainage is perfect, the streams have a fairly regular current, being rarely interrupted by rapids or falls, while lakes, as far as the present writer is aware, are entirely absent. Recent terraces are not found at extreme heights, the highest observed in the vicinity of Dawson having a greatest elevation of about one thousand seven hundred feet above the sea. Such terraces are either rock-cut or are built up of coarse sand and gravel well rounded and smoothed by stream and wave action. They would seem to have been formed near the shore of the ocean during a subsidence of the land. They will again be mentioned under the head of ' Geology.'

South of the line of general glaciation, and within the region which was more or less completely covered by the vast *mer de glace*, or sheet of snow and ice, which stretched northward from the Pacific Mountains during the Glacial period,

THE HUDSON'S BAY COMPANY'S SS. *WRIGLEY* AT THE JUNCTION OF THE MACKENZIE AND LIARD RIVERS

the drainage is imperfect. Lakes occupy the bottoms of many of the valleys and depressions. The streams are in places sluggish and in places broken by swift rapids, for they have not had time to clear their courses of all obstructions and to assume a quiet, regular flow since the glaciers withdrew from the lower land to the higher parts of the mountains. Recent terraces are present up to great elevations, some along the north side of the Coast Range in the vicinity of the Dalton trail having elevations of more than five thousand feet above the sea. These terraces are for the most part composed of deposits of light grey silt or rock flour, laid down over the glacial till, and consequently somewhat later than it in age. In general character this silt is very similar to the white sediment brought down at the present time from the mountains by glacial streams, and it would appear to have been deposited as deltas near the mouths of such glacial streams where they flowed into lakes dammed back by glaciers, or against the sides of the large glaciers themselves. These terraces, though numerous and well defined on the landward sides of the mountains, seem to be utterly wanting on their seaward sides, facing the Pacific.

Hydrography

With the exception of an area of seven thousand square miles in the mountain region of the south-west, which is drained southward by the Alsek River into the Pacific, the surface waters of the Yukon Territory flow northward either into the Arctic Ocean or into Bering Sea.

In the south-east portion of the territory is an area of twenty-nine thousand square miles, drained by the upper Liard River and its tributaries, which flow eastward through a gap in the Rocky Mountains and finally empty into Mackenzie River at Fort Simpson. In the north-east corner of the territory Peel River, another tributary of the Mackenzie, flows northward from a western spur of the Rocky Mountains, known as the Ogilvie Range, and, within the Yukon Territory, drains an area of twenty-eight thousand square miles. In addition to these two rough and mountainous areas which

drain into the Arctic Ocean through Mackenzie River, there is a comparatively unknown tract of country, along the Arctic coast, with a probable area of ten thousand square miles, draining northward by a number of small streams directly into the Arctic Ocean itself.

But the stream which drains the greater portion of the Yukon Territory, and practically the whole of the Yukon plateau, is the Yukon River itself. It is the fifth in size among the rivers of the North American continent, those larger being the Mississippi, Nelson, Mackenzie, and St Lawrence. Its total length is about two thousand three hundred miles, and its total drainage area three hundred and thirty thousand square miles.

Taking it and the Lewes River as one stream, it rises in Teslin, Atlin, and Bennett Lakes in the northern portion of British Columbia, or rather in the tributaries that flow northward into these lakes, and, as the Lewes and Hootalinqua Rivers, flows north-westward, crossing the northern boundary of this province in north latitude 60°, into Yukon Territory, thence through the central part of the territory, where the two streams join, and below their junction continue on as Lewes River to a point opposite Selkirk, in north latitude 62° 47′ 12″, where Pelly River empties into it from the east. From here the united streams are known as the Yukon, and as such the water continues its course first eastward and then north-westward, past the city of Dawson, to the boundary of Alaska, which it crosses a few miles above Eagle City. Its greatest length in Canadian territory, from the head of the southern tributaries of Teslin Lake to the international boundary-line between Yukon and Alaska, is seven hundred and twenty miles, or from the head of the tributaries of Lake Bennett to the same point six hundred and sixty-five miles—six hundred and forty and six hundred and thirty-eight miles of these distances respectively being in the Yukon Territory. From the international boundary it flows westward through Alaska for one thousand four hundred and fifty miles to Bering Sea.

The following are some distances as measured along the course of the stream :

Lewes River

Crater Lake to Northern Boundary of British Columbia	27	miles
Northern Boundary of British Columbia to Carcross	16	,,
Carcross to Whitehorse	70	,,
Whitehorse to Hootalinqua	90	,,
Jennings Creek	60	,,
Teslin Lake	60½	,,
Teslin River	139½	,,
Hootalinqua to Selkirk	192	,,

Yukon River

Selkirk to Dawson	178	miles
Dawson to International Boundary	92	,,

The Lewes-Yukon River is navigable for light-draught stern-wheel steamers from Lake Bennett to its mouth, except for a short distance at White Horse Rapids and Miles Canyon. Its basin in the Yukon Territory, including that of its tributary the Porcupine River, has an area of one hundred and thirty-three thousand square miles.

The principal tributaries of the Yukon River in that portion of Canada now under consideration, with their approximate lengths, are as follows :

Lewes	395 miles	White	200 miles
Teslin	260 ,,	Stewart	375 ,,
Big Salmon	170 ,,	Klondike	150 ,,
Nordenskiöld	130 ,,	Fortymile	150 ,,
Pelly and Ross	450 ,,	Porcupine	500 ,,
Macmillan	200 ,,		

Lewes River rises in a number of long irregular lakes fed by rivulets, some of which take their rise close to the summits of the Pacific Mountains, while others gush from the feet of glaciers that move down their northern slopes. In the Chilkoot and White Passes, the summits of which are respectively three thousand five hundred and two thousand eight hundred and sixty-six feet above the sea, brooks rise within eighteen miles of tide-water in Lynn Canal, and flow

northward to Lake Bennett and the Yukon River, so short and steep is the slope on one side of the watershed, and so gradual is the slope on the other side. The largest and most important of the lakes discharging into the Lewes River are Bennett, Atlin, Tagish, Marsh, and Laberge. Teslin River and Teslin Lake, not taking tributaries into consideration, have a length of two hundred miles, and flow in a direct north-westerly course to join Lewes River thirty miles below the foot of Lake Laberge. The river is navigable by very light-draught steamers at high stages of the water. The lake has a length of sixty miles, a width of one to two miles and a greatest depth of about four hundred feet. Nisutlin River, a stream from two hundred to four hundred feet in width, flows into the east side of this lake. It rises in the high mountains near the head-waters of the Liard River and is from one hundred and fifty to two hundred miles in length. Big Salmon River is a small rapid stream one hundred to three hundred feet in width and one hundred and seventy miles in length. Nordenskiöld River averages one hundred feet wide near its mouth, and is about one hundred and thirty miles long. It rises in Hutshi Lake, which lies in the bottom of a wide grassy valley, and flows northward, joining Lewes River twenty miles above Five-finger Rapids. The sides of its valley are for the most part gently sloping, and scarped banks are seldom seen. The river may be ascended or descended in canoes, but is too small and crooked for steamboats. Pelly River, with its tributaries the Ross and Macmillan Rivers, rises in the high rugged mountains not far from the head of Liard River, and after a general north-westerly course for four hundred and fifty miles joins Lewes River at Selkirk, where the two confluent streams form the Yukon River. It is navigable by light-draught steamers from its mouth up to the mouth of Ross River, a distance of two hundred and fifty miles. White River rises in Alaska on the north side of the St Elias group of mountains and flows at first eastward, across the international boundary, and then northward to join the Yukon ninety-eight miles below Selkirk. Its waters are so heavily loaded with white mud or silt, doubtless carried down from the glaciers at its source,

that below its junction with the Yukon it renders the waters of that stream quite white and opaque with mud. It has a total length of about two hundred miles. It is much too swift and shallow for steamboats to navigate. Stewart River flows into the Yukon from the east, ten miles below the mouth of White River. It rises in the Rocky Mountains near the head-waters of the Peel and Gravel Rivers, and flows at first swiftly and then with a quieter current through extensive wooded or grassy plains. Its total length is approximately three hundred and seventy-five miles. Except for one break at Fraser Rapids, where the water tumbles over a rough ledge of schistose rock, the river is navigable by small stern-wheel steamers from its mouth almost to its source. Klondike River rises in many small streams that flow from the south-western face of the spur of the Rocky Mountains known as the Ogilvie Range, which projects westward towards the Yukon. It is a beautifully clear stream about one hundred and fifty miles long and from one hundred to two hundred feet wide at its mouth. Fortymile River rises in the rather high but wooded mountains of the Ketchumstock Range, in Alaska, and, taking a general north-easterly course for about one hundred and fifty miles, flows into the Yukon River forty miles above where the latter stream crosses the international boundary-line. That portion of it within the Dominion of Canada is only twenty-three miles in length. It is a rapid stream of clear water averaging, near its mouth, one hundred to one hundred and twenty feet in width, and with a depth of from one to three feet. Its valley is here from three hundred to five hundred feet in depth. Neither of these last two streams is navigable by boats larger than canoes or small bateaux, which can be propelled against the stream with poles or tow-lines.

Porcupine River was explored by R. G. McConnell of the Geological Survey of Canada in 1888, and the following statements are made by him in reference to it:

> It heads within 30 miles of the Yukon, approximately in north latitude 65° 30′, and after describing a great semicircular curve to the north-east, falls into the same river a hundred and fifty miles farther down. At its

most easterly point it approaches within eighty miles of the Mackenzie, but it is separated from it by the main range of the Rocky Mountains. Its total length approximates five hundred miles [the lowest 150 miles being in Alaska]. Below the mouth of Bell River its width varies from 150 to 200 yards, and its current barely averages two miles an hour. The valley is generally rather wide and shallow. [The adjoining country is wooded with spruce and poplar. Near the boundary is a stretch of swift water known as 'The Ramparts.'] While passing through the Ramparts it contracts considerably and in places does not exceed seventy-five yards in width. Its current is more rapid than in the upper part, and was estimated to run at the rate of from three to four miles and a half an hour. Short riffles, with a much greater velocity than this, occur occasionally, but no rapids or other obstructions were met with, which would prevent the navigation of the stream by small steamers.

The Ramparts is a local name employed by the traders to designate a contracted walled valley or canon. The portion of the valley of the Porcupine which passes under this name is exceedingly picturesque. In the upper part the banks rise steeply from the water's edge on both sides to heights of from three to five hundred feet, and their green slopes are everywhere broken by shattered pinnacles and bold crags and cliffs of brilliantly tinted dolomites and quartzites standing almost on edge.

Lakes are confined almost entirely to the glaciated district north of the Pacific Mountains. The largest have the following areas:

Teslin	. . . . .	245	square miles
Kluane	. . . . .	184	„ „
Tagish	. . . . .	139	„ „
Laberge	. . . . .	86	„ „

Geology

The following account of the older geology of the Yukon Territory is reproduced, by permission of the director of the Geological Survey branch of the department of Mines, Canada, from a communication by Dr D. D. Cairnes:

As the physiographic provinces of Yukon are co-extensive with those of British Columbia to the south-east and also with those of Alaska to the west, and follow, in a general way, the configuration of the Pacific Coast line ; and as topographic features are, to a certain degree, but expressions of the bed rock structure and composition, it is but reasonable to infer, that in all probability the same general geological horizons which compose the cordillera of British Columbia and adjoining districts to the east might extend through Yukon and Alaska, and, in a measure, this has been found to be true. This persistency of geologic horizons in Yukon, however, and their parallelism to the strike of the physiographic provinces, is only apparent when a broad tract is considered, and is most evident when the entire territory is reviewed.

The Pacific Mountain system in Yukon includes a small portion of the St Elias range and also the northern end of the Coast range of mountains. The extreme southwestern part of the territory is thus occupied by a portion of St Elias range, which seems to be built up of complexly folded sedimentaries, probably chiefly Paleozoic, together with many intrusives. The Coast range consists of an igneous complex of granite rocks intruded mainly as a great batholithic mass exceeding 1000 miles in length, that reaches from south of the 49th to nearly 100 miles north of the 60th parallel.

The geological formations composing the Central Plateau province in Yukon in but few places show any tendency to parallelism with the topographic terranes, but instead are generally very irregularly distributed throughout the district, and include igneous, sedimentary, and metamorphic terranes ranging in age from pre-Ordovician to Recent. The most ancient rocks consist of a series of pre-Devonian schists, gneisses, and limestones, which have suffered intense dynamic-metamorphism, and represent rocks of both sedimentary and igneous origin. These are chiefly or entirely of lower Paleozoic age, but some members may possibly be pre-Cambrian ; they have their most important development in the Dawson district and are thought to have contributed the gold contained in the world-famous Klondike gravels. The sedimentary rocks include Ordovician and Silurian limestones and dolomites ;

Devono-Carboniferous limestones, cherts, quartzites, and slates; Mesozoic conglomerates, sandstones, graywackes, shales, breccias, quartzites, slates, phyllites, dolomites and magnesites; Tertiary sandstones, shales and clays; and Quaternary gravels, sands, silts, clays, peat, muck, soil and ground-ice. The igneous terranes consist of granites, grano-diorites, diorites, syenites, granite, and syenite porphyries, diorites, diabases, dacites, basalts, tuffs, and various related rocks, ranging in age from Devonian to late Tertiary.

As to the extent and distribution of these various geological terranes of the Yukon Plateau province, only fragmentary information is available, as but a relatively small portion of this territory, chiefly along the main waterways, has as yet been geologically mapped. However, although so much of Yukon is as yet unexplored, the different geological formations are known to occur in certain localities.

The pre-Devonian schists, gneisses, etc., extend over at least 12,000 square miles of territory, and occur mainly, so far as is known, in the Klondike and adjoining districts; along the upper waters of the Stewart and Macmillan Rivers; adjoining and to the southwest of Kluane Lake; and extending from Aishihik Lake and vicinity northward to White River. Numerous smaller areas of these rocks also have been noted in the Conrad and Whitehorse districts, and in the Tantalus coal area west of Nordenskiöld River.

Ordovician and Silurian limestones and dolomites have been mainly identified along the 141st meridian south of Porcupine River, where they occur somewhat extensively developed.

The Devono-Carboniferous limestones, quartzites, cherts and related rocks are developed in southern Yukon throughout a broad belt, extending along the Tagish Lake, Marsh Lake, Lewes River, and Lake Laberge, where they cover at least 1500 square miles. Similar beds also have been identified along the 141st meridian between Yukon and Porcupine Rivers and occur extensively along the upper waters of the Stewart and Macmillan Rivers.

The Jura-Cretaceous sediments are somewhat extensively developed in three areas and cover an area of perhaps 600 square miles. Perhaps the largest develop-

ment of these beds occurs along Lewes and Nordenskiöld Rivers, and extends from somewhat south of the latitude of the mouth of Big Salmon River northward to near Pelly River ; these rocks also extend along the greater part of the western shore of Lake Laberge and extend in a somewhat broken belt in a northwesterly direction for over 40 miles, crossing thus Kluska Creek, Braeburn Lake and Schwatka and Hutshi Rivers ; the most southern development of these beds in Yukon lies to the south and southwest of Whitehorse, and is in the form of a northwesterly trending belt of possibly not over 200 square miles extent. The most important coals of Yukon occur at two different horizons in these rocks.

The Tertiary beds extend over possibly 1500 to 2000 square miles of territory and occur mainly in three areas bordering or included in the Klondike gold district. Lignite seams are in places contained in these rocks.

Possibly the most extensively developed igneous terrane consists of the Coast range granitic intrusives of Jurassic or Cretaceous age, that not only comprise the great Coast range batholith composing the Coast range, but also occur in numerous localities in the plateau province to the east, northeast and north. The total extent of the known exposures of these rocks in Yukon is over 12,000 square miles.

With the exception of the granitic intrusives, the igneous rocks of the Yukon plateau are largely volcanics and are distributed more or less throughout the entire plateau province. Some of the most important developments of these rocks occur in the Conrad and Whitehorse districts and also in the Lewes and Nordenskiöld coal area.

But little definite information is available concerning the geology of the Rocky Mountain system in Yukon. From what is known, however, this terrane appears to be anticlinal in structure and to be composed mainly of Palæozoic and Mesozoic sediments, of which Devonian and Carboniferous limestones and quartzites, as well as Cretaceous sandstones, shales, etc., are prominent members.

The high peneplain of the Yukon plateau, which may be called the ' Dome peneplain ' from the Dome at the head of Bonanza and Hunker Creeks, was developed in Tertiary times by what may be called the ' First Cycle of Erosion.'

It may be roughly correlated with the Klamath peneplain in California, though the Miocene rocks which are included in it in Yukon are probably younger than any which have been recognized in the Klamath peneplain. At the time of its completion the country would appear not to have stood very high above sea-level.

But after the close of this 'First Cycle of Erosion,' or period of formation of the 'Dome peneplain,' the land gradually rose until it reached an elevation of something like two thousand feet above its previous level, and a 'Second Cycle of Erosion' was inaugurated.

During this period of elevation, the country received its present configuration, most of the valleys were formed, and their sides were worn down by rain and atmospheric agencies to gentle slopes. In the bottom of the valleys extensive gravel deposits were accumulated; and where the underlying rocks were gold-bearing, or contained gold-bearing quartz veins, as in the Klondike region, the gold was washed down the slopes with the harder and heavier particles, and settled in these gravels. In this way the gold-bearing placers of the lower portion of Dominion Creek and of the white gravel terraces of Bonanza and Hunker Creeks were formed. These gravels are thought to be of Pliocene age, but as no fossils have yet been found in them their exact age is uncertain.

After the close of the 'Second Cycle of Erosion' or White Gravel period, the Glacial epoch began, and great fields of ice accumulated on the Pacific Mountain Range to the south-west and on the Rocky Mountain Range to the north-east. From these mountains glaciers flowed inwards over the plateau country, rounding the tops of the hills and scouring the bottoms and sides of the valleys. But, unlike the conditions in Eastern Canada, these glaciers never at any time covered the whole of the plateau country. In the valley of the Yukon the glaciers from the Pacific Mountains extended only as far as the mouth of the Nordenskiöld River, while those from the Rocky Mountains reached only to the valley of Flat Creek. All the intervening country remained free from ice, except possibly for the presence of small local glaciers at the heads of some of the valleys.

During this epoch of glaciation the country had again been raised and a 'Third Cycle of Erosion' began. At this time the elevation took the character of a tilting of the land from the south northward, so that the streams flowing northward in the unglaciated area were accelerated, and were enabled to deepen their channels rapidly, while at the same time the streams flowing southward were not given any additional power of erosion. In consequence the Klondike River, Bonanza and Hunker Creeks and other streams flowing northward rapidly deepened their channels and cut gorges from two hundred to five hundred feet in depth in the bottoms of their old valleys, while Gold Run, Sulphur, and other creeks flowing southward continued to meander down their old channels without materially deepening them.

In the northward-flowing streams newer and more recent deposits of gravel were formed, partly derived from the erosion of the older white gravels, and partly from the wearing down of the adjoining harder rocks. These lower gravels formed most of the richest placers of the Klondike, having collected into themselves the gold from the older gravels which had been eroded away, and concentrated it into narrower and richer pay-streaks or bed-rock. These gravels are of Pleistocene age, and contain a large number of bones of mammals which are now extinct. The most abundant are those of *Bison crassicornis* and the mammoth (*Elephas primigenius*), while the following have also been recorded: *Bison occidentalis*, *Bootherium bombifrons*, *Mastodon americanus*, *Ovibos moschatus*, *Symbos tyrrelli*, *Cervus canadensis*, *Equus* sp., *Ovis* sp., *Alce* sp., *Rangifer* sp., *Arctotherium yukonense*, *Ursus* sp., *Canis* sp.

On the gentler slopes and on the higher parts of the hills in the unglaciated portions of the plateau country the rock is decomposed to a considerable depth, forming loose sand or silt, which produces a moderately fertile soil. In the southern portion of the territory these hillsides are usually thinly wooded with small poplar trees, or covered with grass and low sage bushes, while farther north they are usually timbered with poplar, birch, and spruce.

In the glaciated areas the bottoms of the valleys are also

often dry and lightly timbered, while in the unglaciated areas, as in the Klondike district and vicinity, they are usually covered with sphagnum swamp. Here, too, the ground is in most places perpetually frozen, often to depths of two hundred feet beneath the surface; though where the moss has been removed, or is absent, it may thaw to a depth of six or ten feet each summer.

Among the features common to this and other subarctic countries are sheets of clear ice, known as chrystophenes, in the bogs beneath the surface of the moss, formed by springs rising through the otherwise frozen subsoil, and spreading out in winter beneath the solidly frozen surface.

Climate

The two features of climate of most importance to ordinary inhabitants are temperature and precipitation. Now the Yukon plateau, comprising almost all the habitable parts of the territory, lies in the interior of the country, shut off from the oceans to the south-west and to the north-east of it by great mountain ranges which arrest the moisture from the winds that blow from these oceans and cause enormously heavy falls of rain and snow on them. After the winds have passed over the mountains and have reached the lower interior country they are consequently dry, and the rainfall from such naturally dried winds or air is therefore light. The months of July, August, and September are the months of heaviest precipitation, the average of these months being from one to two inches each, much of which comes with thunderstorms. Most of the snowfall occurs in the autumn, but light falls occur throughout the winter up to April or May. The average depth of the snow in winter is between three and four feet.

The following table gives the average temperature of the various months of the year as taken at the city of Dawson, and it may be remarked here that the mean monthly temperatures at Dawson in the northern part of the territory are several degrees higher in summer than the temperatures at

Whitehorse in the southern part of the territory, and, on the contrary, they are several degrees lower in winter.

MEAN MONTHLY TEMPERATURE AT DAWSON, YUKON TERRITORY

January	−24°	July	60°
February	−12°	August	54°
March	5°	September	41°
April	28°	October	24°
May	46°	November	−1°
June	57°	December	−10°

The diurnal variations in temperature are slight. On the 21st of May, June, July, and August the sun is respectively above the horizon at Dawson for the following lengths of time :

18 hours and 51 minutes,
20 hours and 48 minutes,
18 hours and 54 minutes,
15 hours and 39 minutes.

High winds are rarely known, the highest wind recorded in Dawson in February 1899 being only ten miles an hour. Judging of the climate by the vegetation, Professor John Macoun says : 'The spring and summer climate in the vicinity of Dawson is as mild as that many degrees further south in Western Canada.

The following are the average dates for some of the principal seasonal events in the vicinity of Dawson :

April 20 to May 1	First flowers appearing on the sunny hillsides. On the latter date the present writer has picked five or six species in bloom.
May 15	Ice breaks up in the Yukon River at Dawson.
June 1	First steamer reaches Dawson on the Yukon River.
June 5	Ice breaks up on Lake Laberge.
July 1	Roses and great numbers of other plants blooming in profusion.
August 23	First frost.
November 10	Yukon River freezes over.

Transportation

In the early days of the rush to the Klondike gold-fields transportation into and through the Yukon Territory was in the summer time either on foot or by canoe, and in the winter time on foot with dogs hauling sleds.

Among the many routes by which the eager gold-seekers endeavoured to reach the Klondike in the years 1897, 1898, and 1899 were the following: from the Pacific Ocean, the Chilkat Pass, the Chilkoot Pass, the White Pass, the Dalton Trail, the Copper River, the Stikine River, the Yukon River up from its mouth. From the east it was approached by what was known as the 'Edmonton route,' which in its turn divided into many different ways as it crossed the watershed between the Mackenzie and Yukon Rivers, by many different passes, almost every pass across the Rocky Mountains from Peace River northward to Peel River having been tried with more or less success. Some of the great army of travellers and adventurers who came in by all or any of these routes reached Dawson quickly, while others kept straggling in for a couple of years.

At the present time there are only two routes in ordinary use into the Klondike district, which is the heart of the Yukon Territory. One route is by ocean-going steamers from the Pacific coast ports of Seattle, Victoria, or Vancouver to Skagway, a distance of about one thousand miles, the average time occupied on the journey being from four to five days. At Skagway the passenger is transferred to the White Pass and Yukon Railway, which carries him for one hundred and ten miles over the summit of the Coast range of mountains to the town of Whitehorse at the head of continuous steamboat navigation on the Yukon River, twenty and a half miles of this distance being in Alaska, thirty and a half in British Columbia, and fifty-nine in the Yukon Territory. Here, in the summer time, large steamers are waiting to take him four hundred and sixty miles down the Yukon River to the city of Dawson, the metropolis of the gold-fields of the Klondike district, while in winter a tri-weekly stage

takes him overland for three hundred and thirty miles, on one of the most delightful drives in the world, to the same place. The whole journey can be made in summer in from five to seven days, and in winter in from seven to eleven days.

The other route is slower, but somewhat less expensive, and is consequently largely used for heavy material and freight which is not perishable. It is by steamer from the Pacific coast ports of Seattle, San Francisco, etc., to St Michaels, near the mouth of the Yukon River, the distance from Seattle being 2487 miles, and the travelling time about ten days. Here passengers and freight are transferred to powerful flat-bottomed, stern-wheel steamers, with excellent passenger accommodation, and by them are brought one thousand six hundred miles up the Yukon River to Dawson. Many of these steamers carry as much as five hundred tons, and at the same time they may also tow barges carrying in all two or three times this quantity.

From Dawson small steamers run up the Lewes River and around Tagish and Atlin Lakes, while similar steamers occasionally run up Stewart River for two hundred miles, and up the Pelly River for two hundred and fifty miles, besides up several other smaller streams for varying distances, in order to accommodate, and bring supplies to, prospectors and fur hunters.

In the Klondike district itself the Klondike Mines Railway runs from Dawson for thirty-two miles to Sulphur Springs, on the southern slope of the divide between Bonanza and Dominion Creeks, giving easy access to most of the gold-bearing creeks in the district.

In the basin of the Yukon River, and especially in the vicinity of the towns of Dawson and Whitehorse, excellent wagon roads, with a total length of between four hundred and five hundred miles, have been built by the Canadian government. The immediate effect of building these roads was that rates for freight to points along them were cut down from six dollars to one dollar a ton, or in this proportion. In addition to these roads, which are serviceable throughout the year, seven hundred miles of roads have been cut out and partly graded so as to be serviceable for horses and sleighs

during the winter. One of these roads runs from Whitehorse to Dawson, a distance overland of three hundred and thirty miles, and is used by the stages of the White Pass and Yukon Railway. On it stage-houses are located at convenient places about twenty miles apart, where horses are changed, and meals and accommodation for the night are provided.

In the winter time horses and stages provide means of communication along all the most travelled routes, but to remote districts or to places to which no roads have been built dogs and dog-sleds, such as those used by the Indians before the advent of the white man, are still in general use.

History

Towards the end of the eighteenth century and at the beginning of the nineteenth the energetic and hardy fur traders of the Hudson's Bay and the North-West Companies pushed northwards down the Mackenzie River to the Arctic Ocean and across the Rocky Mountains to the Pacific Ocean on waterways that carried them in one case east and in another case south of what is now the Yukon Territory. Trading-posts were established on these waterways, and the Indians of the country were not only invited to come into these posts to trade, but were followed to their hunting grounds, often at long distances in the interior. In their active competition to secure furs the employees of the two companies above named travelled long distances and endured great dangers and hardships. Few of them left any records of their travels, but at a later date they often served as guides for others who did leave accounts of their journeys through the country for the guidance of posterity.

In 1821 these two great fur-trading companies decided to cease commercial hostilities and form a coalition, and for a number of years after that date very little exploration was prosecuted, the fur traders settling down quietly to enjoy the fruits of their previous energies, or of the more active and energetic endeavours of their predecessors. However, it was inevitable that, in their eager search for furs, they

should continue to push farther and farther back into the most remote recesses of the wilderness. In the prosecution of the fur trade Robert Campbell seems to have led the way into the Yukon Territory.

In the year 1838 Robert Campbell ascended the Liard River to its head-waters at Dease Lake in Northern British Columbia, where he occupied a trading-post for a year. In the spring of 1840 he again ascended the Liard River from Fort Halkett, with seven men in one canoe, to the junction of the Dease and Frances Rivers, but this time, instead of turning southward up the Dease River into British Columbia, he turned northward up the Frances River, and ascended the stream as far as Frances Lake in the Yukon Territory. Here some of Campbell's men remained and established a trading-post, first called Glen-Lyon House and afterwards Fort Frances, while he himself continued over the height-of-land and descended the Pelly River for a short distance, naming the stream after Sir John Henry Pelly, governor of the company. At that time Campbell does not appear to have had any idea as to where the waters of this river finally emptied.

In 1842 Fort Pelly-Banks was built on the Pelly River, and the following spring Campbell descended this river to the mouth of the Lewes, where the two streams join to form the Yukon. In 1848 Fort Selkirk was erected at this point and was occupied until 1852, when it was destroyed by Indians. In 1842 J. Bell of the Hudson's Bay Company crossed from the Mackenzie River by the Peel to the head-waters of the Porcupine, and in 1846 he descended this stream to where its waters join the Yukon. Here, in the following year, Fort Yukon was built by Murray, another employee of the Hudson's Bay Company. In 1850 Campbell descended the river from his own Fort Selkirk to Murray's Fort Yukon, thus establishing the identity of the two streams. After the destruction of Fort Selkirk in 1852 there was no white habitation in the whole territory for many years, for Fort Yukon, the Hudson's Bay Company's trading-post at the mouth of the Porcupine River, was in what is now Alaska.

About 1873 Harper and a number of associates prospected

westward from the Mackenzie River over to the head-waters of the Porcupine and other tributaries of the Yukon River, and found gold in the sand and gravel along their banks, but nowhere in sufficient abundance to pay the expenses of mining in that remote country. So these men entered the service of one of the American companies trading for furs on the lower portion of the Yukon River. But shortly afterwards the rich discoveries in the vicinity of Juneau, Alaska, in 1879, gave a new incentive to search for gold in the North, and within the next few years Harper, McQueston, Mayo, Densmore, and others were trading along the river and occasionally doing a little prospecting.

About 1884 some of these men, along with others who came into the country over the Chilkoot Pass, discovered gold in paying quantities on Stewart River, and two years afterwards coarse gold was also discovered on the Fortymile River close to the international boundary-line, the rich placer diggings on Franklin Gulch, a little farther west, being discovered the following year. From that time onwards for the next decade the mouth of Fortymile River, known as Fort Cudahy, was the centre of the government of the country. Here a post of the North-West Mounted Police was built and a mining recording office, with a properly constituted government recorder, was established.

On August 16, 1896, George Carmack discovered coarse gold on Rabbit Creek, afterwards called Bonanza Creek, and staked two claims—Discovery, and one below Discovery; Tagish Charlie staked two below, and Skookum Jim staked one above, Discovery. The story goes that Carmack's Indian wife panned the gold from the gravel at the side of the Creek and showed it to him as he was lying idly smoking in his camp, but perhaps this is merely a definite statement invented to give interest to the discovery. These men recorded their discovery at Fort Cudahy, showed the gold which they had found, and started a stampede of all the people round the place to Bonanza Creek, which was almost immediately staked from its source to the mouth. So the great Klondike rush began. But it was not until the following year, when a steamer arrived at Seattle with a load of

Klondike gold, that the outside world began to look towards the northern country.

That year, 1897, all the boats plying northward from Seattle and Vancouver were loaded with prospectors and fortune-hunters. In the following year there was a great rush over the Chilkoot and White Passes and down the Yukon River to the Klondike. The North-West Mounted Police, who had gone to the country in 1894 and were therefore close at hand when gold was discovered on the tributaries of the Klondike, kept record of the number of people who crossed the summit and descended the Yukon River.[1] Since that time a city has been built at Dawson and towns have been built at Grand Forks, Granville, and several other places on the gold-bearing creeks, as well as at Whitehorse at the northern terminus of the White Pass Railway, and the country has assumed a settled character with stable government and all the amenities and comforts of civilized existence.

Constitution and Government

In 1909 the Dominion government issued a blue-book[2] giving an account of the Yukon Territory, which relates in detail the manner in which the law is administered in this remote corner of Canada. It is as follows:

> In 1894 a detachment of the North West Mounted Police had been sent to the Yukon under the command of Inspector Constantine, who was authorized to represent all the different departments of government in the district. In the following year the mining industry had grown to such proportions that Inspector Constantine was no longer able to handle all the busi-

[1] Movement of People into the Yukon Territory between years 1897 to 1900 inclusive

Prepared by Col. A. B. Perry, Supt. R.N.W.M. Police.

1897.	Men, Women, and Children	.	700	Boats, scows, etc.	.	.	150
1898.	„ „ „	.	28,000	„ „ „	.	.	7124
1899.	„ „ „	.	5,434	„ „ „	.	.	880
1900.	„ „ „	.	8,452	„ „ „	.	.	973
	Total	.	42,586	Total	.		9127

[2] *The Yukon Territory, its History and Resources*: Dominion Government, 1909, pp. 15-18.

ness he was called upon to transact, and an officer was appointed to take charge of the customs. In 1897 a gold commissioner was appointed, and the recording office was removed from Fortymile to the site of the present city of Dawson. In 1898 the Yukon was created a Territory by an Act of Parliament, and provision was made for local government by a legislative council composed of the commissioner and six persons to be appointed by the Governor in Council. In July 1898, Mr William Ogilvie was appointed commissioner, and assumed the administration of affairs, the other members of the council being the registrar, the superintendent of the North West Mounted Police, the judge of the Territorial Court and the legal adviser to the commissioner. In the following year the gold commissioner was also appointed a member of the council. The council, at that time, met several times each month for the transaction of business, which included not only the enactment of necessary legislation for the peace, order and good government of the Territory, but also the expenditure of much money for hospital and charitable purposes and for the construction of roads and trails to the different creeks, as well as the disposal of a multitude of minor affairs of a purely municipal nature.

In 1899 the Yukon Territory Act was amended, and provision was made for the election of two members to the Yukon Council. In 1902 the Act was further amended, providing for the election of five members. By Chapter 37, 2 Edward VII, provision was made for the election of a member to represent the Yukon Territory in the House of Commons of Canada, and on the 2nd December, 1902, the Honourable James H. Ross, who had resigned the commissionership, was elected the first member of parliament.

The Yukon Territory Act (Chapter 6, 61 Victoria), 1898, provided for the appointment of a commissioner to administer the government of the Territory under instructions from the Governor General and Minister of the Interior, and the appointment of not exceeding six persons to be a council, to aid the commissioner. This Act as amended in 1899 (Chapter 11, 62-63 Victoria) provided for two elected members of council, and as further amended in 1902 (Chapter 34, 2 Edward VII), for five elected members. The elected

members hold office for two years, and are paid an indemnity for attendance.

The Act was further amended in the year 1908, Chapter 76 of 7-8 Edward VII, so as to provide for a wholly elective council of ten members, to hold office for a term of three years and to be convened by the commissioner at least once in every year. This council to sit separately from the commissioner and to present bills passed by it for the commissioner's assent. This amendment to come into effect on the 1st day of May, 1909.

The Supreme Court of Record is the Territorial Court, which is presided over by a senior judge and two other judges. It has appellate, civil and criminal jurisdiction. The Territorial Court en banc has appellate jurisdiction in appeals from the judgment of a police magistrate given under Section 785 of the Criminal Code, 1892. In relation to mining disputes an appeal lies from the decision of the Territorial Court en banc to the Supreme Court of Canada. For the purposes of Part LII, Criminal Code, and amendments, an appeal lies from the judgment of the Territorial Court to the Supreme Court of Canada, unless the judges of the Territorial Court are unanimous, when there shall be no appeal.

Under Chapter 6 of 1906, the commissioner may refer to the Territorial Court for an opinion upon constitutional or other territorial questions. The decision of the court, although advisory only, shall, for purposes of appeal, be treated as a final judgment of the court between parties.

The commissioner, members of council and judges of the Territorial Court, and every commissioned officer of the Royal North West Mounted Police, can exercise in the Yukon Territory all the powers of one or two justices of the peace, under any laws or ordinances, civil or criminal, in the Territory. All persons possessing the powers of two justices of the peace can act as coroners.

The commissioner can establish unincorporated towns, and arrange for the election of an overseer. Overseers shall hold office for the calendar year ensuing after the day on which the election is to be held, but may be removed by the commissioner.

But the government of the country has not always been as satisfactory as it is to-day. Of the conditions as they existed in the autumn of 1901 J. H. Curle, the author of *The Gold Lines of the World*, writes as follows :

> The Government of the Yukon Territory, in which lies the Klondike district, is controlled by the Canadian minister of the Interior at Ottawa. He, in his turn, has had to rely on advisers who knew nothing of conditions there, and, as a consequence, the handling of the mining industry—the backbone of the country—has been weak and inefficient. There are, firstly, far too many officials, and from the gold commissioner downwards, nearly all are ignorant of mining matters. The local mining laws are weak; the miners are for ever quarrelling over boundaries and water rights, and the only remedy appears to be a lawsuit, or series of suits, in the local courts. The gold commissioner, his assistants, and the claim inspectors, seem to have no power—or to be afraid to use it. Their only remedy is 'Oh ! take it into court.' Dawson, as a consequence, reeks with lawyers and litigation. A couple of Australian mining wardens, of the old school, who would ride up the creeks themselves, interrogate the parties to a dispute, and settle the matter on the spot—sticking the boundary and water-right pegs into the ground themselves, and warning the men to touch these at their peril—would do more good than the dozens of officials there now, and would soon empty the courts of litigants.

Population

The population of the Yukon, with the exception of the native Indians, having been chiefly attracted by the rich gold discoveries in the Klondike, was drawn from almost all parts of the world, and is, consequently, of an exceedingly motley character. The total number of Indians, according to the census of 1901, was 3302, made up of a few Tlinkits in the south who travel backwards and forwards from the Pacific coast, of Athapascans of a number of different tribes in the great Interior district, and of a few Eskimos along the Arctic coast. The census of 1901 is very imperfect as to the nationality of the people, for out of a total population for the territory of

27,219 the birthplace and nationality of 6384 is not given. Deducting this number, with the 3302 Indians already enumerated, the record of places of birth of the white or foreign residents is as follows: Canada, 4861; Great Britain and Ireland, 2416; Australia and other British possessions, 253; United States, 6707; Norway and Sweden, 1265; Germany, 746; France, 174; Japan, 87; other foreign countries, 1024.

Since 1901, when the production of gold in the Klondike was at its highest point, the population of the territory has gradually declined, until in 1911 it was only 8512.

Water Powers

The streams in the territory, rising as they do in the mountains to the south and north, will be able to furnish a large quantity of electric energy when power-plants are installed on them. The mean flow of some of the more important rivers is as follows:

Yukon River at International Boundary	135,000	second feet
Stewart River	27,000	,, ,,
Fortymile River	6,500	,, ,,
Klondike River	2,000 to 4,000	,, ,,
Twelvemile River	250 to 500	,, ,,
Fifteenmile River	300	,, ,,
Indian River	100	,, ,,
Pelly River	5,000	,, ,,
Rock Creek	100	,, ,,

The lower portions of these streams have moderately even grades, so that any attempt to develop power from them there would be difficult and expensive, but there are many favourable places, as at Fraser Falls on the Stewart River, where power-plants could be readily installed. On the upper courses of many of the tributaries of the above-named streams the grades are steep, and power-plants could be installed at comparatively slight expense. At the present time (1913) a plant is being installed on the upper Twelvemile River which is intended to generate five thousand horse-power.

Flora

Throughout the Yukon basin the timber line has a general elevation of from 3500 to 4500 feet above the sea. On the islands, and in the intervales in the bottoms of the valleys, as well as in many of the gullies on the hillsides, white spruce (*Picea canadensis*) may be found up to twenty inches or even more in diameter, with good tall trunks, so that in some cases three logs, each twelve feet long and at least twelve inches in diameter, can be cut from a tree. On the Klondike River and on Bonanza and Hunker Creeks such timber once grew in considerable abundance, before it was cut down to serve the necessities of the miners. Along the banks of many of the streams balsam poplar (*Populus balsamifera*) grows to a large size. On the more imperfectly drained places in the intervales, and on most of the hillsides, black spruce (*Picea mariana*) grows with an average thickness of about six inches. In the same localities canoe birch (*Betula alaskana*) grows to about the same size, while many of the drier benches are covered with small aspens (*Populus tremuloides*). The western jackpine (*Pinus murrayana*) is found on some of the drier benches as far north as the banks of Stewart River. The subalpine fir (*Abies lasiocarpa*) is found on the higher slopes of the mountains in the southern portion of the territory.

On April 30, 1899, the following notes were made by the present writer: 'Walked up the hill behind the town of Dawson and found a large number of purple anemones (*Anemone patens*, var. *Nuttalliana*) in bloom. Mr Cran, Manager of the Bank of British North America, informs me that he collected them on the 21st inst., and that he saw them with others on the 16th inst.' On May 1: 'Walked to the hill across the Yukon. On the sunny hillsides many of the aspens are in flower, while the catkins are out on the birches, alders and willows. Anemones are in great profusion, and *Saxifraga reflexa* (?) is beginning to open. The sage-bushes are soft and green, and the buds on the rose-bushes are reddening, ready to burst.' On May 14: 'The anemones

are fading, but many other plants are beginning to shoot up. A pretty blue flower (*Polymomium humile*, var. *pulchellum*) is in bloom in a few places, and *Sheperdia canadensis* is in full flower.' Of the wild fruits native to and growing in the country the following are the most common in order of abundance: blueberry (*Vaccinium uliginosum*), cranberry (*Vaccinium vitis-idaea*), red currant (*Ribes rubrum*), red raspberry (*Rubus strigosus*), cloudberry (*Rubus chamaemorus*), Arctic raspberry (*Rubus arcticus*, var. *grandiflorus*), bearberry (*Arctostaphylos uva-ursi*), black currant (*Ribes hudsonianum*).

During the summer of 1899 the present writer made a collection of one hundred and thirty-three species of plants from the bottoms of the valleys and from the lower hillsides in the Klondike district, about which Professor John Macoun, the Dominion botanist, made the following comment: 'The great majority of the plants found in meadows, bogs, woods and river-bottoms grow within one hundred miles of Ottawa.'

Very little timber is now available on the principal creeks in the Klondike district, where mining is being actively prosecuted. There is excellent timber along the Stewart and Pelly Rivers and their tributaries. The chief supply for the mills at Dawson is obtained from the islands along the upper Yukon and from the Klondike valley, which is bordered at intervals from the mouth of Hunker Creek to the mountains by groves and small tracts of well-grown spruce timber. Good timber is also available along the Yukon, and can be easily and cheaply floated down to Dawson.

Agriculture

To the world at large the Yukon territory has seemed, since it was first exploited, little more than a treasure-house of furs and minerals. That it has agricultural possibilities is rarely taken into consideration. But the government blue-book,[1] already quoted with regard to the government of the territory, in the following account of its agricultural resources

[1] *The Yukon Territory, its History and Resources*: Dominion Government, 1909, p. 123.

shows that it has tracts of cultivable land that can be made highly productive.

Though the agricultural resources of the Yukon are beyond doubt of considerable economic value, yet it must not be considered that the territory is suitable for occupation, at the present time, by a large number of agriculturists depending absolutely upon this industry. A large agricultural community can only exist in a country where the produce of such an industry can be disposed of at a reasonable profit, or where access can be obtained to markets at a distance, provided transportation rates will permit of fair competition. In the Yukon the principal industry is mining, and agricultural development must necessarily proceed according to the requirements of the population engaged in the mining industry. Farming operations can only be successful so long as those who are engaged in agricultural pursuits produce no more than is required for consumption within the Territory.

During the past few years comparatively large quantities of oats, potatoes and vegetables have been grown along the Yukon valley, particularly in the vicinity of Dawson, and in nearly all cases excellent results have been obtained. It is computed that the quantity of potatoes grown near Dawson in 1908 and placed on the market aggregated 200 tons. It has been estimated that the population at that time in the Yukon consumed annually over $200,000 worth of potatoes. Potatoes grown in the Yukon are quite equal in size to the imported product, and when the proper kind of seed is planted in suitable soil and attention is given to the cultivation, potatoes can be grown fully equal in quality to the best outside product. The best quality of potatoes so far have been grown on the islands in the Yukon River. On the land surrounding Dawson, either in the valleys or on the benches, potatoes of good quality can only be grown after the land has been cultivated for a few years. On an island in the Yukon River at Ogilvie 175 pounds of potatoes were planted on the 12th of May, 1906, and by the first or second week in September the crop was ready for lifting, and yielded 8000 pounds. The ground was ploughed as early in April as the frost would permit, stable manure and

about 300 pounds of lime per acre being applied. The potatoes were planted as near the surface as possible and hilled up as the vines grew. It is estimated that during the present season a much larger quantity of potatoes will be grown than in former years, and some of those interested in agriculture predict that within the next few years there will be a sufficient quantity of potatoes grown to supply the market. Besides what is required for the local market, a considerable quantity of potatoes is shipped every year to Fairbanks, and other points in Alaska.

On an island in the Yukon at Ogilvie three or four bushels of oats per acre were sown about the first of May, and harvested about the middle of August. The yield was about two tons of oat-hay per acre, which was sold at an average of $50 per ton. Native hay, averaging one and one-half tons per acre, was also harvested about July 15.

About thirty miles up the Stewart River is what is known as the Mazie May ranch, owned by Mr Samuel Henry. Mr Henry applied for this land in 1897, and in the summer of that year harvested 26 tons of native hay. In 1906 about 100 acres were under cultivation. In 1902, 125 tons of oat and native hay were cut and sold from this ranch. The native hay is cut about the middle of July and the oat-hay about the first of August. After the hay is harvested it is placed in stacks for about three weeks, and then baled in a 16 by 18 baling press. It is then shipped to Dawson by steamer, if possible, and if a steamer is not available it is brought down the river on rafts. The rate for carrying this hay to Dawson, a distance of about 100 miles, is $7.50 per ton. Mr Henry has also grown rye and barley, but finds the oat-hay more profitable. A mixed lot of 800 pounds of timothy, clover and red top, was sown on a piece of well cultivated land of about eight acres, but the result was unsatisfactory. Clover seems to grow well in a wild state around Dawson, and there does not seem to be any reason why it should not grow equally as well on cultivated land if it is properly seeded. Mr Henry is of opinion that much of the seed may have been lost by being covered too deeply. The native hay grown on this ranch was sold at from $55 to $60 per ton.

At the head of Flat creek, about sixteen miles from

Dominion, there is a ranch of 160 acres, on which are grown oat-hay, turnips, potatoes, vegetables, and a large quantity of native hay is also harvested. On this ranch there are cows, hogs, poultry, etc. Dairy farming is carried on on a small scale, butter being made, for which there is a ready demand on the creeks in the locality. Besides the native hay required for the cattle, a large quantity is sold to freighters. It is estimated that along the Flat creek valley there are twenty square miles of good agricultural and meadow land. Of the large quantity of excellent hay which grows wild in this valley, only a comparatively small quantity is harvested, apart from the ranch, some freighters cutting only as much as is required, under permit, for feed for their horses. There are also several farms situated along the Klondike valley.

About four miles up the Pelly there is a farm of 100 acres which supplies oat and native hay to the roadhouses along the winter trail, and also to cattlemen who drive cattle over the winter trail in the spring, the hay for the cattle being placed at different points along the trail. Most of the root crops grown in this vicinity are disposed of at the roadhouses along the trail. Oats have been ripened and threshed in the Pelly district, but not to any great extent.

At the present time, however, we can only say that the development of agriculture must necessarily depend upon the development of the mining industry. Under existing conditions the Yukon agriculturist could not possibly compete in outside markets. The price of labour is high, and for competition in agricultural products, distance and transportation rates are prohibitive.

Fauna

In the settled districts, such as the Klondike, where miners are working steadily and constantly, the wild animals indigenous to the country have been driven back into the forests, while in the vast unsettled and often unexplored regions the animals and birds are fairly plentiful, at least as plentiful as they are in other remote portions of North America. The animal and bird life of the territory is similar to that of most of the northern parts of the continent.

Moose (*Alces americanus gigas*) are abundant in the forests of all the unsettled parts of the country, wherever the miners and prospectors have not killed them off. Their shed horns may be seen lying in profusion among the willows and dwarf birches on the summits of the ridges. Caribou (*Rangifer arcticus*) are reported to cross parts of the country in great numbers on their annual migration to and from the shores of the Arctic Ocean, and the large woodland caribou (*Rangifer montanus osborni*) are moderately plentiful in the mountains at the head-waters of the Pelly and Macmillan Rivers. Mountain sheep (*Ovis dalli*) inhabit the higher peaks and open tracts on the summits of most of the mountains in the extreme northern portion of the territory, as well as in the Pacific Mountains to the south, but in the mountains at the head-waters of the Klondike, Stewart, and Pelly Rivers these white sheep are replaced by darker varieties, which are known as *Ovis fanningi* and *Ovis stonei*.

From time immemorial these animals have furnished the native Indians with their most important supply of food. They have also proved of great assistance to prospectors and miners in their efforts to explore and open up the country, for from them was derived their principal and often their only supply of fresh meat. During the early days of gold-mining in the Klondike, when food was often scarce and always expensive, many thousands of carcasses of these animals were brought down from the mountains and sold to the miners, providing them with wholesome and necessary food.

Of fur-bearing animals marten (*Mustela americana*) are probably the most abundant and valuable, the dark, glossy pelts of many of these animals caught in the country near the upper waters of the Pelly and Stewart Rivers being particularly beautiful. Mink (*Lutreola vison*), otter (*Lutra canadensis*), wolverine (*Gulo luscus*) and black bear (*Ursus americanus*) are also abundant, while lynx, beaver, musk-rat, and black and red foxes are occasionally met with in south-eastern sections of the territory. Rabbits (*Lepus americanus macfarlani*) are abundant everywhere in certain years, after which they regularly die off and almost disappear. In 1903 they were particularly numerous along the Yukon River.

Of birds the willow and rock ptarmigan, ruffed grouse and spruce partridge, as well as the raven, Canada jay and a small redpoll, winter in the country, while many other birds, including water-fowl, spend the summer in it, or pass over it on their way to and from their nesting grounds farther north.

Where wild animals are so abundant and thrive so well, domesticated animals have also been found to thrive. Dogs, both native and introduced, the latter of all kinds, from the St Bernard to the bull-pug, are common. In winter they are almost indispensable for hauling loaded sleds over the snow and ice.

Horses were first used in the Yukon by E. J. Glave and J. Dalton in 1891, and were found to thrive well on the native grasses. Since then great numbers have been brought into the country. In the winter of 1898-99 a large band of horses belonging to the Royal North-West Mounted Police were allowed to run loose over the hills near Tagish without attention or food other than the grasses that they could themselves procure from under the snow, and almost all were found alive and in fairly good condition in the spring. Another band roamed at will all winter, and gathered their own food, on the hills near the mouth of the Nordenskiöld River, and were brought down the Yukon River to Dawson in the following spring. In the beginning of the same winter at Dawson a horse had been turned out to die, as the owner had no food for it, but it passed the winter in the hills behind the town, pawing away the snow and cropping the grass beneath it, and in the spring it was again caught by the owner and put to work, after which it continued to work in Dawson and vicinity for a number of years.

Cattle have been brought into the country in large numbers, most of them to be killed for beef, but some cows are kept on dairy farms to supply milk to the people. As yet labour is too expensive and feed is too dear to permit of raising cattle in the country, but there is nothing otherwise in the nature of the country or climate to prevent people from breeding cattle.

King and dog salmon ascend the Yukon River and many

of its tributaries, and are caught in great numbers opposite the town of Dawson and as far up the Stewart River as Fraser Falls; while grayling (*Thymallus signifer*) may be caught with the hook and line in almost all the streams in the country. The total catch of fish of all kinds in the year 1908 is given as follows:

	lb.
King salmon	101,500
Dog salmon	15,000
Whitefish	69,500
Grayling	52,000
Lake-trout	24,400
Tullibee	7,000
Ling	5,500
Pickerel	4,000
Mixed and coarse fish	7,200
	286,100

Mining

Gold.—Gold-mining has been the principal and controlling industry in the territory up to the present time, the agricultural and other products having been used for the support of the gold-miners and those dependent on them. Gold has as yet been mined entirely from gravel deposits, for although it has been found in reefs and ledges in a number of places, none of these have so far been worked at a profit. The history of gold-mining in the country, therefore, is the history of its placer-mining, and this has been confined largely to the Klondike district, though gold-bearing gravels have been found on many other streams outside this district, such as the Big Salmon, Lewes, Stewart, Fortymile, etc. The native gold in nuggets, pellets, and dust is found free in the gravels on the banks and bars of streams and in the alluvial deposits that form the bottoms of the valleys. These gravel deposits are classed as placers, but there is a very vital difference between such mines on the tributaries of the Yukon River and other alluvial or placer mines in countries farther south, a difference so great as to put them, from an operative standpoint, in a class by themselves.

The gravel is frozen into a solid mass, and remains frozen summer and winter alike, and at the same time it is almost everywhere covered by a layer, from two feet to as much as one hundred feet in depth, of vegetable mould or 'muck,' which is also frozen into a solid, coherent, icy mass. On the banks of the streams farther south the miner, with his pick, shovel and rocker, or sluice-boxes, can take up the gravel and wash the gold from it cheaply and easily, but here the pick will make little or no impression on the frozen ground. The gravel has to be first thawed by some means before it can be raised, and the development of the most economical methods of thawing it has been a dominant factor in profitable mining in the Klondike.

For two years after gold was discovered by George Carmack on the banks of Bonanza Creek mining was almost exclusively confined to the gravel deposits in the bottoms of the valleys, and was performed entirely by hand, with the assistance of such simple implements as the pick, shovel, wheel-barrow, and windlass.

Two general methods of mining were in vogue, depending on whether a claim was worked as a pit or 'cut' open to the surface, or through a shaft or shafts and tunnels or chambers underground. The first method, usually known as 'ground-sluicing and shovelling in,' involves expensive preparation before the pay-dirt can be reached. It is conducted as follows: a narrow ditch is dug in the muck lengthwise of the claim, and a part or the whole of the water from the adjoining brook is turned into the ditch by a wing-dam. The water rapidly deepens the ditch to the level of the bottom of the muck, or the top of the underlying gravel, and the miners pick down the muck and ice from the sides of the ditch into the running water below, by which it is in part dissolved and in part carried away down the stream. As the ditch is thus widened, the water is kept flowing against one side by little dams, and thus an area from one hundred to two hundred feet in length and fifty feet or more in width is freed from its covering of muck, and the underlying sand and gravel is laid bare to be thawed by the sun and warm winds and rain of the remainder of that or the following

summer. Of the gravel so exposed the upper portion usually contains so little gold that it is of no value. It is, therefore, shovelled into wheel-barrows and wheeled away and dumped to one side, all the ground being removed until the gold-bearing layer near the bed-rock is reached. A dam is then built in the stream some distance above the area of uncovered gravel, which being now lower than the surrounding part of the bottom of the valley, or than the bed of the stream itself, is known as the cut; and a flume is built from this dam to sluice-boxes, which are strung on a proper grade across the top of the cut. Water is turned into the flume and sluice-boxes, and the pay-dirt is then shovelled, usually in two stages, from the bottom of the cut into the sluice-boxes.

This shovelling-in is a slow and expensive process, for wages are high, even though many of the men employed have never been accustomed to handle a shovel. An average gang of six men, working in a cut and shovelling dirt into the sluice-boxes in two stages, will thus handle from fifteen to twenty cubic yards in a day of ten hours. In some of the richest mines the expense was, of course, a trifling matter compared to the great value of the output. For example, in the summer of 1898, at one mine, a force of six or eight men, working for three shifts of ten hours each, produced eight gold-pans full of clean gold. The owner at the time was obliged by law to pay a royalty of ten per cent of this gross output, and the return made by him of the value of this clean-up was $45,000.

The other method—drifting—in vogue in the early days of the Klondike camp, chiefly on claims where the muck and underlying barren gravel were too deep to permit of their being removed economically by the process of open cutting just described, was conducted as follows :

In the winter season a shaft, about three feet by six feet in horizontal dimensions, was picked down through the frozen muck to the sand or gravel. As a rule it is not difficult to pick out the muck, as it flakes off easily ; and much of it is so free from grit that it will not even blunt the point of the pick. As soon as the shaft was sunk to the gravel, a fire was built

in the bottom of it, and after this fire had burned out, and the gases arising therefrom had risen to the surface, the gravel that had been thawed by the fire, extending probably to a depth of from twelve to eighteen inches, was dug out and hoisted to the surface with a bucket and hand-windlass. Another fire was then built in the bottom of the shaft, the gravel being afterwards removed as before, and so the work went on until bed-rock was reached. One and sometimes two fires were lit in a shaft each day. When bed-rock was reached, fires were built against the face of the gravel, green timber being piled on the dry wood to keep the heat down as much as possible, and the gravel and bed-rock were hoisted to the surface as before and piled up in a dump. During the following spring, when the water was flowing in the adjoining creek, it was diverted into sluice-boxes and led past the dump, the surface of which, as it was thawed by the sun and atmospheric agencies, was scraped off and shovelled into the water in the boxes, the rate at which this pay-dirt could be handled being determined by the rapidity with which the dump thawed. If the dump was large, it might not thaw out thoroughly until well on towards the end of the summer ; and, when the creek was a small one, it very often happened that the water in it, supplied by the melting snow of the previous winter, failed and so put an end for that season to the possibility of sluicing.

Exact accounts were rarely kept in the Klondike in those days, except by the banks, so that it is difficult to determine the precise cost of much of the mining that was then done, but it is safe to say that it varied from ten dollars to twenty-five dollars and more to the cubic yard.

Such underground mining, with the help of wood fires, could only be carried on in winter, for at that time of year the air in the drifts, though at freezing-point, was much warmer and lighter than the air above, which was probably 50° lower in temperature, and the noxious gases formed by the fires would quickly rise to the surface and be dissipated ; while in the summer the air in the drifts, with its load of noxious gases, being surrounded by frozen ground, was still at freezing-point, and the air above was much warmer and lighter,

so that the poisonous gases generated by the fires would not rise to the surface, and men were consequently unable to work in the drifts.

But the miners were determined, if possible, to prospect and work their claims whether the season was summer or winter, and after a number had been overcome and killed by gas, the following plan was adopted :

A shaft was picked down through the frozen muck to the gravel as before, and then a big fire was built on the surface at the top of the shaft in which a number of large rocks were heated. These were then thrown to the bottom of the shaft and covered with moss or brush. Next day the moss, brush, and rocks, now cool, were hoisted to the surface with a windlass and as much of the gravel as the hot rocks had thawed ; then the rocks were again heated and thrown down the shaft, and the process was repeated until the bed-rock was reached.

Such were the methods of mining practised in the Klondike in 1897 and 1898, and it must be remembered that such are still the only methods available in remote districts to which machinery cannot be transported.

But men soon began to recognize that while shallow ground might be worked by hand with a possibility of profit, deep ground, which would need to be undermined, must be thawed in some other way than by wood fires or hot rocks if it was to be mined quickly and cheaply, and that most of the mining in the country must be done in deep ground. Many plans were suggested and tried for thawing ground, but it would appear that John McGillivray, a mining engineer from California, was the first to adopt the method which has since come into general use. In the winter or spring of 1899 he took a small steam-boiler to a mining claim on Sulphur Creek, and then began thawing the frozen gravel by steam, the method adopted being about as follows :

A shaft was picked down through the muck, and near it the boiler was set up on the surface. A small iron pipe was connected to the boiler and run down to the bottom of the shaft, where it was connected by an india-rubber hose to a loose piece of one-half-inch pipe pinched in at the point. Steam was raised in the boiler to a pressure of from twenty to

thirty pounds to the square inch, a valve which had been set in the pipe was opened, and steam was let into it. The loose pipe, known as the 'point,' was then gradually pushed or driven into the gravel to its full extent, the steam issuing from the aperture at its tip thawing the gravel in front of it, and it was allowed to remain for several hours, during all which time steam was supplied through it from the boiler to the gravel in front of and around it. In this way the gravel was thawed to a much greater depth than a wood fire would penetrate, and by increasing the size of the boiler and the number of points, a long section of the wall of a drift could be readily thawed at one time.

McGillivray's plant was undoubtedly inefficient, as the pipes, rubber hose, and especially the points were too weak for the work required of them, but nevertheless he had discovered the correct way of thawing frozen ground by steam. From his little boiler and plant has developed the efficient steam-thawing plant in use at the present time in so many of the placer mines of the Yukon Territory and Alaska. The plant consists of a boiler of twenty-five to fifty horse-power, not too heavy so as to be immovable under ordinary conditions ; iron piping to conduct the steam to the place where it is to be used ; steam-hose of the best quality ; and points, five feet or more in length, made of double-thickness hydraulic steel-pipe, each with a tip of very hard manganese steel, in the end of which is a hole a quarter of an inch in diameter, and a heavy steel head, into the side of which is welded a hollow nipple over which the steam-hose may be clamped. The points are driven into the gravel, or loose bed-rock, with a heavy mallet, while at the same time the steam from the boiler, which is kept at a pressure of from eighty to one hundred pounds, is turned into them. As a rule they can be driven to their full length in a few minutes, for the steam thaws the gravel in front of them very quickly, while at the same time it prevents any pebbles or chips of rock from becoming wedged in the hole in the tip.

One great advantage of this steam-thawing plant was apparent from the first, namely, it made underground mining of frozen ground possible in summer. It not only meant that

mining could be prosecuted throughout the whole twelve months of the year, it also meant that the dirt mined in summer need not be piled up in dumps, from which it would again need to be thawed and afterwards shovelled into sluice-boxes, but that it could be discharged into sluices as soon as it was extracted, and that the gold could be immediately separated from it.

There are many occasions on which the steam-thawer is now used, other than for thawing the gold-bearing gravel in the drifts underground. A shaft may be sunk with it, either by driving short points vertically into the frozen ground, and digging out the thawed dirt from time to time, or by driving a long point, from twenty to thirty feet long as occasion may require, vertically down through the muck and gravel to bed-rock, steaming it for a day or two, and then digging out the whole of the thawed dirt at once, the result being a shaft with roughly circular outlines. Dumps of pay-dirt extracted during the winter, and again frozen hard, may be quickly thawed by the steam-thawer in order to enable the miners to make full use of the heavy rush of water in the spring to wash the gold from the gravel. In the open cuts the uncovered gravel may be thawed in order to hasten the mining work in the early summer, or to prolong it in the autumn.

In some mines pulsometers are used underground to thaw the pay-dirt in the drifts, the water being pumped over and over again against the face of the gravel, breaking it down and washing it and the gold contained in it back for a short distance, this latter process being assisted by a man with a rake. In this process the water is heated by the condensation and discharge into it of the steam used in the pulsometer. In other mines a similar result is attained by pumping water with a small duplex pump from the sump against the face of the gravel, the water being first slightly heated by steam direct from the steam-pipe.

At first the steam generated in the boiler was used entirely for thawing the frozen ground, and the pay-dirt, as before, was shovelled into small buckets, dragged on skids to the shaft, hoisted with a hand-windlass, and then emptied by hand on the dump or into the sluice-box. This arrangement

necessitated the keeping of one windlass man on the surface for each miner underground, and so, with firemen, wood-haulers, etc., it meant that altogether too small a proportion of the crew was actually engaged in getting pay-dirt. Small steam-hoists were therefore introduced, which would hoist as much as two or three men could shovel up and bring to them ; but this did not materially lessen the cost of operations, for more wood as fuel was needed to generate steam to supply the hoisting engine, a man was needed at the engine and another at the top of the shaft, and thus the amount of unproductive labour demanded was but slightly reduced. The limit of size of the bucket raised by the hoist was determined by the size and weight which the man at the mouth of the shaft could handle and empty.

The greatest improvement in the mechanical moving of the pay-dirt was accomplished by the invention of the self-dumping cable-tram, or ' Dawson carrier,' carrying a bucket with a capacity of from nine to eleven cubic feet. By its means one man at the hoist can raise from the shaft, and either pile up in a conical dump or empty into a sluice-box, as much dirt as eight or ten miners underground can pick down and wheel to the hoisting bucket. By its assistance pay-dirt in solidly frozen ground can be mined from tunnels and drifts, and hoisted and sluiced for about three dollars a cubic yard, with wages at six dollars a day and dry spruce wood for fuel at ten dollars a cord. Since, with this plant and in a properly conducted mine, about two-thirds of the men employed are working underground with pick and shovel, it is not likely that this cost can be greatly reduced while wages remain at their present rate.

The modifications of the methods of open cutting and ground-sluicing adopted in 1897 and 1898 have been usually on well-known engineering lines, and have not exhibited the same originality as has been shown in the improvements of the underground mining methods. The general practice is still to pick the muck down into the stream and then to allow the water to carry it off. After the muck has been removed and the frost has been drawn out of the gravel by the warm air of one or two summers, the barren upper gravels are

usually removed, either with shovels and wheel-barrows, horse-scrapers, or steam-scrapers, and piled into waste dumps.

After the barren gravel has been removed the pay-dirt is either shovelled into sluice-boxes set in the bottom of the cut, the water used being afterwards raised by a centrifugal pump to the general surface level ; or the sluice-boxes are set over the cut, and the pay-dirt is shovelled, usually in two stages, into them ; or the sluice-boxes are set above and to one side of the cut, and the pay-dirt is wheeled to a bucket which is hoisted in some way, preferably by a ' Dawson carrier,' and emptied into the sluice-boxes.

In mining the gravel on the terraces or benches, high above the level of the streams, the early miners were usually at the disadvantage of having no water immediately available, so that the pan and rocker were the only washing plants that could be used, and water for these had often to be carried up a height of several hundred feet in pails. The owner of one of the richer of these claims might have from six to ten men with rockers working for him, but on account of the great expense of such work no attempt was made to mine ground that would yield gold of less value than fifteen or twenty dollars a cubic yard.

After the narrow belts of rich and shallow ground along the edges of the benches or terraces had thus been shovelled off, and the gold extracted from them in rockers, the miners began to run adits into the hills along the bottom of the gravel, on top of bed-rock, and to bring out the pay-dirt to the ' rim ' to be washed in rockers. But this process of mining and hand-washing proved entirely too slow and expensive. Consequently the pay-dirt was mined and brought out to the mouths of the adits, where it was piled up for a time, and was then either run down the hill in a chute to a sluice set near the creek, and supplied with water from it ; or, if it was impossible to dump tailings on the creek claim, a pump was installed, and water was pumped up the hill, and allowed to run down again through the sluice-boxes, being often used two or three times over by different parties in its descent. At a later date ditches, sometimes several miles in length, were dug to bring water from tributary streams at a sufficiently

high elevation to enable the miners to wash these dumps of pay-dirt.

The methods of mining adopted on these terraces, or so-called 'hillside' claims, were for the most part very similar in character to those used in underground mining in the creek claims. An adit was run along the top of the bed-rock to the rear boundary of the claim, or as far as pay-gravel could be found, and drifts were driven at regular intervals at right angles to it. The intermediate pillars were then taken out, a certain amount of timbering being usually necessary to support the roof while the pay-gravel from these pillars was being recovered. In most of these mines the ground was frozen and had to be thawed with steam-points; but in some cases, generally where the overburden of barren gravel was more than two hundred feet thick, the ground was not frozen, and in such places mining could progress much more steadily and regularly. In some instances, however, the claim which the miner desired to work did not extend to the rim, so that it could not be worked from an adit; and in that case it was necessary to sink a shaft and mine in the same manner as in the bottom of the valley, the chief difference being that the shaft was usually deeper, and the expense of obtaining water for washing the gravel was very much greater. In other instances, after the value of the gravel in these bench deposits had been proved by tunnelling, water was pumped up from the creek in the bottom of the adjoining valley to heights of from fifty to one hundred feet above the level of this gravel, and was then delivered against it through hydraulic giants, thus washing it off the rocky bench on which it lay, the water with its load of gravel being directed in its flow through cuts in the bed-rock, and then through sluice-boxes in which the gold was caught before it was allowed to fall into the valley below. The enormous expense of installing such a pumping plant in a region so remote and difficult of access, and the great cost of fuel after the plant had been installed, soon proved that such a method of mining was too expensive, even for the very rich ground that was being operated upon; but it also proved that hydraulic methods of mining were quite feasible in the

Klondike, and that the frost in the ground was no bar to the employment of such methods.

The gold-washing and separating apparatus in use in the Klondike has remained practically unchanged throughout the life of the camp. Leaving the 'rocker' out of consideration, it consists of a string of sluice-boxes, each twelve feet long, twelve or fourteen inches wide at the upper end, and two inches narrower at the lower end. These boxes are placed so that the small end of one box just slips into the large end of the one below it, and are supported and braced so as to have a grade of from six to nine inches to each box. In the middle of the string there is usually one box much larger than the others, called a 'dump-box,' in which a man stands with a heavy 'sluice-fork' to stir the gravel and throw out any rocks too large to run easily through the smaller boxes. In the bottom of all these boxes small rounded poles, called 'riffles,' are laid lengthwise, and are fastened together by short transverse strips every six feet. Water varying in quantity from two hundred and fifty to seven hundred gallons a minute is turned into and allowed to flow through these sluice-boxes, and as the pay-dirt is shovelled or emptied into them, it is carried along by the water, and the gold settles to the bottom and is caught between the riffles, while the gravel and sand is discharged from the lowest box at the tail of the sluice. The riffles are raised and taken out from time to time, and while a small quantity of water is allowed to flow through the boxes, the gold is carefully separated with wooden paddles and brushes from the gravel caught with it in the riffles.

In 1900 a dredge was installed on the Cassiar Bar, on the Lewes River, twenty-seven miles below the mouth of the Teslin, and was operated for a year or two without success, apparently because there was not sufficient gold on the bar, or because the gold did not descend to any considerable depth into the gravel. In the following year it was brought down to Bonanza Creek and set up on Claim 45 below Discovery, where it operated for a short time and whence it was removed to the Discovery group of claims, where it finally operated with great success. This was a ladder and bucket dredge

with bucket stacker, and though too small for the work, it proved to be the correct type. Dredges of such type, if properly managed, save very nearly all the gold at a very much lower cost than the material can be handled in any other way. However, they labour under the disadvantage of not being able to work in frozen ground. So far this difficulty has been overcome by thawing the ground in front of the dredge with a steam-thawer, which, however, adds greatly to the cost.

Since this dredge was installed many others have been added, so that during the summer of 1911 there were working on the river bottoms in the Klondike in all about seventeen dredges, most of which were digging in frozen ground, though in a few cases, on account of local conditions, the ground proved not to be frozen. The absence of large boulders makes the gravel very easy to handle with these dredges, after it has been thawed or when it is free from frost, and the dredging industry should prove one of the most profitable of the mining industries of the country for many years to come.

Hydraulic mining was begun early in the history of the camp, but with comparatively little regard to the expense of obtaining the large quantity of water that is necessary for this method of operation. The first hydraulic plant was started on Hunker Creek by George Johanssen, who spent a large sum of money in buying a number of hill claims. He operated by pumping up water from the creek at an enormous cost. Other similar operations were then begun on Bonanza Creek, but, in most if not in all cases, without financial success, even though a very large quantity of gold might be recovered. Gradually all these pumping plants were abandoned, and water was taken from the small creeks and tributaries of the larger streams and was used at a low head against the gravels, cutting them down, the gold being recovered from them in sluices.

About 1906 a large impounding dam was built near the head of Bonanza Creek, forming a reservoir with a capacity of three hundred and fifty million gallons. The water from this reservoir is taken through ditches, flumes, and pipes, with a total length of nine miles, and is used on the hill claims in

the valley of Bonanza Creek, near the mouth of Eldorado Creek. In the same year the Yukon Gold Company also undertook to bring water to Bonanza and Hunker Creeks from the upper waters of the Twelvemile River, which flows into the Yukon eighteen miles below Dawson, and has its source in the Rocky Mountains to the north-east. This great artificial waterway has now been completed to carry 125 second feet, or five thousand miner's inches of water, at a cost of more than $3,000,000. It has a total length of seventy miles, made up as follows: ditch, 38 miles long and 9-20 feet wide, with 3½ feet depth of water; flume, 19·6 miles long, 6 feet wide, and 4 feet deep; pipe, wooden-stave, steel bound, 8·8 miles in total length and 42-54 inches in diameter; pipe, steel, 3·8 miles in total length, 42-49 inches in diameter, the steel varying from ¼ to $^{11}/_{16}$ inch in thickness.

The water enters the ditch at an elevation of 3320 feet above the sea, and is delivered from the pipe on the south side of the Klondike valley at an elevation of 2240 feet above the sea, or 1040 feet above the level of the Yukon River at Dawson. The water from this great ditch is being used to break down and wash the gold from the extensive deposits of white terrace gravel that occur along the Klondike River and its tributaries.

In the Klondike the chief producing creeks have been Bonanza, Eldorado, Hunker, Bear, and Dominion with its tributaries Gold Run, Sulphur, and Quartz.

In 1906 R. G. McConnell, of the Geological Survey of Canada, made a careful estimate of the past production and future possibilities of the gold-bearing gravels, and the following figures are taken from his report to the Canadian government.

Speaking of the gravels of the Third Cycle, or Creek gravels, he says: 'The Eldorado paystreak has a length of about four miles, and its production up to the present is estimated at $25,000,000, or about $1200 a running foot for the bottom of the valley.' But some of the claims 500 feet in length yielded more than a million dollars, or more than $2000 to the running foot of valley bottom. 'Upper Bonanza Creek, the portion above Eldorado Forks, proved rich up

to Victoria Gulch, a distance of about four miles. The pay-streak in places rivalled that on Eldorado Creek in richness, but the general average grade was considerably lower. The past production is estimated at $15,000,000,' or more than $700 to the running foot. Lower Bonanza Creek has a length of about ten miles, and with the tributary gulches has produced about $11,000,000. Klondike River flat has produced $1,000,000. Bear Creek has produced $1,000,000. Hunker Creek with its tributaries has produced $14,000,000. Dominion, with its tributaries Gold Run, Sulphur and Quartz, has produced $24,250,000.

Some of the gravel on the creeks was phenomenally rich. One pan of gravel weighing about fifteen pounds, taken from undisturbed deposits on Bonanza, and washed in the presence of the writer, yielded forty and a quarter ounces of gold, the largest nugget in the pan weighing an ounce and a half.

In speaking of the terrace gravels of the Second Cycle of Erosion McConnell says: 'The gravel in the paystreak of all these Upper Bonanza (and Eldorado) hills proved rich everywhere, and in places the values returned appeared almost fabulous. Whole claims are reported to have averaged from $60 to $100 per square yard of bedrock. Portions of French, Gold, Chichaco and Magnet hills were particularly rich, and yields of a dollar a pan, or $150 per cubic yard for the lower four or five feet of gravel, are stated to have been obtained from small areas of these hills.' A number of cases of much higher values than the above have been credibly reported. On both French and Gold Hills men have taken out with a rocker as much as five thousand dollars a day, and as the men probably would not handle more than two and a half cubic yards apiece, the yield would be about two thousand dollars a cubic yard. The yield of these gravels from Boulder Hill upwards is placed at $24,000,000. The terrace gravels on Bonanza Creek below Boulder Hill yielded $750,000. The similar gravels on the hills of Hunker Creek produced $2,500,000. At the same time (1906) McConnell placed the estimated future output of all the Klondike gravels at about $63,000,000, since which time up to January 1, 1912, the country has produced a total of $19,715,000.

Up to January 1, 1912, gold-mining in the Yukon has produced gold of the following quantities and values :

Calendar year	oz. (fine)	Value
1885 } 1886 }	4,387	$100,000
1887	3,386	70,000
1888	1,935	40,000
1889	8,466	175,000
1890	8,466	175,000
1891	1,935	40,000
1892	4,233	87,500
1893	8,514	176,000
1894	6,047	125,000
1895	12,094	250,000
1896	14,513	300,000
1897	120,937	2,500,000
1898	483,750	10,000,000
1899	774,000	16,000,000
1900	1,077,553	22,275,000
1901	870,750	18,000,000
1902	701,437	14,500,000
1903	592,594	12,250,000
1904	407,938	10,500,000
1905	381,001	7,876,000
1906	270,900	5,600,000
1907	152,381	3,150,000
1908	174,150	3,600,000
1909	191,565	3,960,000
1910	....	4,550,000
1911	....	4,455,000
		$140,754,500

These are the official returns as given by the Geological Survey and the bureau of Mines of Canada and computed from the returns of the American Mint and the banks and government offices in the Yukon, with reasonable allowance for gold that could not be accounted for through these channels. Some people are inclined to add largely to these

figures for gold lost and unaccounted for, but a residence of seven years among the miners of the Klondike convinces the present writer that such enlarged figures are mostly gross exaggerations and that the official estimates are quite high enough to account for every ounce of gold that has come out of the country.

Silver.—The production of silver has been confined, with the exception of a very small amount taken from the prospects in the Southern Yukon, to the quantity occurring with the gold and extracted from it when it is reduced to bullion. In the early days of the camp no account was taken of the amount of silver produced, but later the following may be taken as its production :

Calendar year	oz.	Value
1900 . .	290,000	$177,857
1901 . .	195,000	114,953
1902 . .	185,000	96,965
1903 . .	156,000	83,382
1904 . .	133,170	76,201
1905 . .	94,255	56,885
1906 . .	66,665	42,522
1907 . .	35,988	23,510
1908 . .	63,000	33,304
1909 . .	45,000	23,176

Copper.—Copper occurs in the southern portion of the Yukon Territory in a belt extending from near the town of Whitehorse westward to the international boundary-line. In the vicinity of Whitehorse the ore is in the form of sulphides and is found in more or less extensive contact veins along the contact of limestone and acid intrusives. A large number of claims have been staked, and from these some ore has been shipped southward to the smelter on Vancouver Island, but the high cost of transportation and the consequent excessive cost of labour and supplies has militated very strongly against the successful operation of these properties.

Near the international boundary-line at the head-waters of the White River and its tributaries native copper is found in some abundance in the gravel along the stream, and in time the recovery of this copper may prove to be a productive and successful industry.

Tin.—As yet tin has not been found in commercial quantities in the district, but rounded particles of cassiterite or tinstone were constantly found in the sluice-boxes in the Klondike with the gold, and it is possible that in some places it may be discovered in paying quantities.

Tungsten.—Scheelite, one of the ores of tungsten, was found in some abundance associated with gold in the sluice-boxes on Duncan Creek near the head-waters of the Stewart River, but so far it has not been discovered anywhere in commercial quantities.

Antimony.—Some veins rich in antimony ore have been discovered in the mountains on the Wheaton River southwest of Whitehorse, but up to the present (1912) they have not been worked.

Coal.—In rocks of Lower Cretaceous age, at about the same geological horizon as the Kootanae rocks in which coal is so abundant in the Rocky Mountains in Alberta, coal is found at a number of places in the Yukon Territory, varying in character from anthracite in the Wheaton district to lignite at many places on the Lewes and Yukon Rivers. In the reports of the Geological Survey the area known to be underlain by coal is given at four hundred square miles, and the estimated quantity available is given as follows

Anthracite	32,000,000 tons
Bituminous coal, often making excellent coke	32,000,000 ,,
Lignite	850,000,000 ,,

But further examination will doubtless add largely to these figures.

Some coal from the Tantalus mine on the Lewes River has been used to supply the steamers on the Yukon River, and some from the mines on Coal Creek, north of Dawson, is being supplied to the Dawson market at about thirteen

dollars a ton retail, but the quantity used in the territory is not large. However, as industries of various kinds increase in number, this great reserve of fuel and potential energy may prove to be one of the greatest natural assets of the country.

J. B. Tyrrell.

THE NORTH-WEST TERRITORIES

THE NORTH-WEST TERRITORIES

Position and Extent

THE North-West Territories of Canada as here understood comprise the provisional districts of Mackenzie, Franklin, and Keewatin, which lie north of the Provinces of Alberta, Saskatchewan, and Manitoba, and extend from the northern boundaries of these provinces northward to the Arctic Ocean, and in the Arctic Ocean itself include the islands as far north as land has been discovered.

This vast district has a total area of one million two hundred and fifty thousand square miles. It reaches from north latitude 60° to about latitude 83° at the northern point of Grant Land, or a total distance of fifteen hundred and eighty-seven miles, and from west longitude 64° on the eastern side of Baffin Land to west longitude 136° 30′ at the eastern boundary of Yukon Territory, or a total distance east and west of two thousand three hundred and seventy miles.

Topography

In such an enormous area there are naturally many different kinds of country, though there are none which can be distinctly classed as mountainous. As a general designation it might be characterized as an undulating plain or tableland, the undulations in places becoming somewhat strongly accentuated; while in the great area near the west coast of Hudson Bay, and on most of the Arctic islands, they are not strongly accentuated, and the country accordingly has an even and regular relief.

Of the Arctic shore we as yet know very little. In

most places it is low, and it probably rises gently inland, except where it is broken by occasional rocky hills.

Of the western shore of Hudson Bay we have much more exact information. A great alluvial plain, rising usually not more than a few feet to the mile, extends inland for distances varying from one hundred miles in some parts to three or four hundred miles in others. This plain extends from south of James Bay northward past York and Churchill up to Chesterfield Inlet, and doubtless beyond. Throughout this area the minor inequalities have been levelled or filled, and many old shore-lines and gravel beaches show the height at which the water of Hudson Bay once stood. The slope of this alluvial plain is so slight, and the drainage is so much impeded by the raised beaches, that the land is very wet. Within the more southern forest area it is almost one continuous swamp or ' muskeg.'

West of the alluvial plain the surface is more irregular in detail, and many small lakes occur, but at the same time the greatest elevations do not rise to any great altitude, and the highest point known between the west coast of Hudson Bay and the Mackenzie River is only about fourteen hundred feet above the sea. West of the Mackenzie River the land rises fairly regularly, and the western boundary of the North-West Territories is for a considerable part of this distance marked by the watershed of the eastern range of the Rocky Mountains.

Hydrography

That portion of the North-West Territories lying within the continental area has a shore-line on the Arctic Ocean between the eastern boundary of Alaska and Lyon Inlet on Fox Channel, exclusive of minor irregularities, of 3500 miles, and on Hudson Bay and Strait between Lyon Inlet and Cape Chidley of 4200 miles. The islands in the Arctic Ocean and Hudson Bay also have a shore-line of many thousands of miles.

All the shores look out over tidal water, but the tide rises to very different heights in different places : on Hudson Strait, 37 feet ; in Chesterfield Inlet, 18 feet ; at Fort

THE FIRST PORTAGE ON SLAVE RIVER

Churchill, from 9 to 15 feet; at Fort Nelson, from 9 to 14 feet; at Moose Factory, 5 feet; and near the mouth of Mackenzie River not more than a few inches.

On the Arctic coast and on the west coast of Hudson Bay harbours are not numerous, as the water for the most part is very shallow, the wet tidal shore often having a width of several miles.

As the surface of the country is very irregular the drainage is imperfect and immature, and there are great numbers of lakes often connected by rapid shallow streams with comparatively small and insignificant valleys. In some districts lakes are so numerous and water so abundant that at least a quarter of the surface is covered with water.

The principal lakes with their areas are as follows:

Great Bear Lake	11,800	square	miles
Great Slave Lake	10,700	,,	,,
Dubawnt Lake	1,600	,,	,,
Kasba Lake	200	,,	,,
Clinton-Colden Lake	670	,,	,,
Aylmer Lake	612	,,	,,
Point Lake	600	,,	,,
Yathkyed Lake	850	,,	,,
Baker Lake	1,000	,,	,,
Martin Lake	1,200	,,	,,
Pelly Lake	330	,,	,,
Schultz Lake	125	,,	,,

Of the rivers which flow through the country the largest is the Mackenzie with its great tributaries the Liard and Slave, besides a number of smaller tributaries, such as the Gravel, Peel, Arctic Red, Hare Indian, and Great Bear. The Mackenzie River rises in the Rocky Mountains between latitudes 52° and 53° 30′, and as the Athabaska River flows eastward and northward through the Province of Alberta into Lake Athabaska, whence it issues as the Slave River, and thence descends to Great Slave Lake, picking up the waters of the Peace River on its way. The total drainage area of the Mackenzie and its tributaries is 682,000 square miles.

In the Slave River, just on the boundary-line between

Alberta and the territories, there is a heavy rapid, but from that point northward the river is continuously navigable, so that steamers of considerable draught can run through Great Slave Lake, up the Liard River for one hundred and twenty-five miles, and down the Mackenzie River to its mouth in the Arctic Ocean. The total length of this river from its source to its mouth is 2525 miles, the length of the Slave River is 265 miles, and the Liard River is 550 miles, the upper portion of this latter river being within the Province of British Columbia.

Peel River is chiefly in the Yukon Territory, but it flows for sixty miles within the North-West Territories.

The next largest river is the Dubawnt, which rises in Wholdaia Lake at an elevation of 1290 feet, and flows a little north of east and then eastward into Chesterfield Inlet. Its total length, including the inlet, is 875 miles, and its drainage area about 60,000 square miles. It is a series of wild shallow rapids over boulders or rough loose stones connecting small lakes. At only one place, just below the outlet of Dubawnt Lake, is there a rapid with rocky walls and with any considerable drop, the river at this rapid having a drop of two hundred feet in two miles.

East of Dubawnt River, Kazan River rises in Kasba Lake at an elevation of 1120 feet above the sea and flows north-north-east parallel to Dubawnt River, emptying into the south side of Baker Lake, an expansion at the head of Chesterfield Inlet. The total length of this river from its source to its mouth in Baker Lake is 500 miles.

Backs River rises in Sussex Lake and flows with a rapid broken current into the Arctic Ocean south of King William Island, its length being 600 miles and its drainage area 47,000 square miles.

Coppermine River has been traced for a length of 300 miles from Point Lake to the Arctic Ocean, but its length above Point Lake is not known, probably from 100 to 200 miles, giving it a total length of about 500 miles and a drainage area of about 30,000 square miles.

These rivers and lakes form the main highways of travel through the country, both in summer, when the water in

them is open, and in winter, when they are covered with snow and ice. As the length of time that they are open has very much to do with the ease of access into the country, this matter will be discussed in the section of this article dealing with transportation.

Climate

The climate over this vast area varies greatly, from temperate in the south-western portions of Mackenzie through sub-Arctic to Arctic on the northern shores of Hudson Bay and on the islands in the Arctic Ocean. Throughout most of the country the winter is severe, and it is probable that much of the general impression of the country is derived from this winter temperature. After all, it is the summer temperature which counts in considering the habitability of the country and what it will produce to support its population.

The precipitation of rain and snow together, judged as rain, varies from ten to thirty inches, being greatest near the shore of Hudson Bay, and decreasing to about ten inches in the Mackenzie valley. Near Hudson Bay the air is moist and the weather is very often cloudy, while farther inland bright clear skies and dry atmosphere are the rule, rain falling generally in sudden and heavy showers.

R. F. Stupart, director of the Meteorological Service of Canada, makes the following reference to the temperature of the country west of Nelson River :

> The temperature conditions of the district between Lake Winnipeg and Split Lake in the several months, May–September, may be compared with Europe as follows :
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> | | |
> |---|---|
> | May . . | 50°-40°, with north of Scotland and Southern Norway. |
> | June . . | 56°-54°, with Scotland. |
> | July . . | 63°, with south of England. |
> | August . | 57·5° to 55°, with Scotland. |
> | September . | 50°-45°, with Northern Norway and Sweden. |

Geology

The geology of the territories west of Hudson Bay is fairly simple in general plan, though often very complicated in detail. Through the whole country from south-east to north-west runs a great ridge or belt of Archæan granites and gneisses, etc., known as the Archæan protaxis, and overlying this granitoid belt, both to the north-east and the south-west, newer rocks are found extending upwards in the geological scale as high as the Cretaceous.

In the Archæan protaxis itself most of the rocks are silicious in character, being chiefly granites, grano-diorites, etc., of Laurentian age. But included in it are also large areas of dark-coloured and often fine-grained basic rocks of Keewatin age, and it is interesting to note that the latter are far more likely to contain valuable mineral deposits than the former. Therefore it is highly desirable that their presence and extent should be determined in order to guide the prospector in an intelligent investigation of the country.

On the north-east side of the Archæan protaxis, or perhaps included in its edge, are the Huronian quartzites of Marble Island and other localities on the west coast of Hudson Bay. Overlying these are extensive areas of Cambrian or pre-Cambrian sandstones, which are known to occur on the lower portion of the Dubawnt River and at many places along the Arctic coast. At the north-western end of the protaxis these sandstones would appear to cross completely over it from the Arctic coast to the valley of the Mackenzie River at Great Bear Lake. With these sandstones are associated extensive areas of amygdaloidal trap and basalt.

On the shores of Dubawnt Lake these traps are very well developed, but their greatest extensions appear to be in the vicinity of the Coppermine River and of Coronation Gulf, where they are associated with native copper. A further description of them will be found in the discussion on mineral deposits.

Ordovician and Silurian limestones overlie the crystalline Archæan rocks on parts of Southampton and other islands in

Hudson Bay and on a large number of the islands in the Arctic Ocean, as well as on some of the shores of Boothia and Melville Peninsulas. Farther north these limestones are again overlain by Carboniferous sandstones and limestones containing extensive beds or seams of coal. From one of these coal-seams the Canadian steamer which regularly patrols the Arctic Ocean takes its supply of coal. To the south-west and west of the Archæan protaxis a somewhat similar series of rocks is found.

In the valley of Great Slave Lake the Cambrian or pre-Cambrian sandstones and traps are exposed over considerable areas, while a little farther south, within the Provinces of Alberta and Saskatchewan, and just outside the boundaries of the territories, the same sandstones are very extensively developed to the south-east of Lake Athabaska.

Farther north on the Slave and Mackenzie Rivers the Ordovician and Silurian limestones do not outcrop, for here the Devonian limestones rest directly on the Archæan. These latter extend down the Mackenzie River and to the west of it for a long distance. As the country rises towards the mountains along the western boundary of the territories the lower limestones, etc., again make their appearance. Overlying all these Palæozoic limestones, sandstones, etc., Cretaceous and Laramie sandstones and shales cover small areas in the vicinity of the Great Bear Lake River and along the Mackenzie River near and below it, as well as on the Liard River in the extreme south-west portion of the territories.

Since Archæan times, or at least since the age of the copper-bearing sandstones and traps, at times in the earth's history when the various parts of the territories were beneath the level of the sea, the rocks were deposited in regular sequence one above the other. At other times, when the country was above sea-level and subject to active erosive agencies, these same rocks, along with any earlier ones which were exposed, were worn down and carried away into the sea, where they were redeposited.

It is doubtful if any portion of the earth's surface has been more stable, during the long period of time since the pre-Cambrian era until now, than this northern part of Canada.

It has been subjected to slight movements up and down, but no great Orogenic movements have broken it, or twisted and distorted the rocks by which it is underlain.

Such are the underlying rocks occurring throughout this great area of nearly a million and a quarter square miles. Since these rocks were formed, and after their surface was subjected to processes of decay through long ages, the Glacial period set in, when the whole country from east to west and from north to south was covered with a vast body of ice. This ice appears to have had its greatest thickness somewhere in the vicinity of Dubawnt Lake and to have moved outwards in all directions from that lake northward, southward, eastward, and westward, carrying with it the rock that had been disintegrated by atmospheric agencies during preceding ages, while at the same time it often shattered, and to some extent broke to pieces, the underlying harder rock. This moving ice had the effect of carrying away all the disintegrated rocks from the higher portions of the surface to regions that are far outside the area under consideration, and of filling in with rough loose stones and broken fragments of rock some of the deeper depressions, leaving the country a little more level than it was before the ice covered it, and at the same time leaving its surface either bare rock or stony clay and silt.

When the ice-sheet disappeared the country was four or five hundred feet lower in elevation than it is at present, and so surfaces that are now less than four or five hundred feet above the sea were then beneath it, and received the drainage from the adjoining land. But as the ice disappeared the land began to rise to its present level. In rising, beaches and shore-lines were formed one after the other, and beds of clay, sand, and gravel were deposited on the glaciated surface. These old beaches are conspicuous features in the vicinity of Hudson Bay.

In the part of the country nearest the centre of distribution of the ice-sheet, and where it last disappeared, there has been little oxidation or decomposition of the rock, and very little soil has been formed; but in the valley of the Mackenzie River and in the country to the west of it, which

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were only reached by the margin of the ice-sheet, and from which it consequently first melted away, the summers are very much warmer than they are farther to the north-east, and the surface clays have been much more thoroughly oxidized, so that a deep layer of rich and fertile soil has been formed.

Transportation

The means of transportation in North-Western Canada are still in a very primitive condition, and the methods of travel throughout most of the region are much the same as those used by the natives and the fur traders from time immemorial. As yet no railways have entered this country and no wagon roads have been built in it, so that travel is necessarily limited to boats on the streams and lakes in summer and to sleighs drawn by dogs over the frozen surface of both the land and water in winter. The Arctic islands are, of course, a partial exception to this rule, because they can only be reached occasionally by ships.

The largest stream in the country, and in fact the third largest river on the continent of North America, is the Mackenzie. This river has an average width of about a mile and is navigable without obstruction from Fort Smith through Great Slave Lake to the Arctic Ocean, a distance of about twelve hundred miles, to which may be added the total length of Great Slave Lake, about three hundred and fifty miles, and two hundred and fifty miles of the lower course of the Liard River. On the Mackenzie are steamboats, with a draught of six feet, which make one or two voyages a year from the head of navigation to its mouth.

Apart from the Mackenzie River, the only means of travelling by water as yet is with small boats or canoes, and as the length of the open season on the various streams and lakes is the important factor in governing this travel, the following information with regard to the various streams is of interest.

On the Mackenzie River below Great Slave Lake the ice usually breaks up each year some time between the first and

middle of May, and from that time onwards until the first of November the river is open. Approximately the same dates hold good for the Slave River above Great Slave Lake, but this lake itself does not break up until much later, the usual time for the ice to leave it varying from the last week in June to the first week in July ; sometimes, however, it is possible for a boat to work its way through or around the western portion of the lake from the mouth of Slave River to the head of Mackenzie River a little earlier. Great Bear Lake is late in opening. It begins to break up about the end of June, but it is not until the first or second week in August that the ice is all out of its eastern end. It freezes again about the same time as Great Slave Lake, namely, about November. In regard to the smaller streams throughout the country, the ice begins to break up in them before the middle of May, and they are usually free of ice before the first of June ; but the smaller lakes which form expansions along their courses are usually covered with ice until the second week of June. Dubawnt Lake is probably the most ice-bound of all the water stretches in the country. In 1893 it was found to be largely covered with ice from the first to the tenth of August, though it was possible to travel in canoes close to the shore between the ice and the land. The natives state that it is never entirely free from ice.

For a little while, both in the spring and fall, while the lakes and rivers are breaking up, and again while ice is forming on them, it is practically impossible to travel, except for short distances, on land, but for the remainder of the year land travel is entirely on foot or with sleighs or toboggans drawn by dogs. This method of progression is necessarily slow and the quantity of goods or baggage that can be carried is small, but long distances can be covered if proper arrangements are made and sufficient time is allowed for the journey.

Population

The population of the Mackenzie valley has suffered considerable change and modification since the country was first visited towards the end of the eighteenth century. It was

then occupied entirely by Indians belonging to the Tinne or Athapascan family. The various branches of this family, with the districts now occupied by them, are as follows :

Chipewyans .	Athabaska and Reindeer Lakes and vicinity.
Yellow Knives .	Great Slave Lake and eastward to the Barren Grounds.
Dogribs . .	Great Slave Lake northward to Great Bear Lake.
Hare . .	North of Great Bear Lake.
Loucheux .	Lower Peel River.
Slavies . .	Valley of Mackenzie River, above Great Bear Lake River.
Nahane . .	Mountains west of Mackenzie River.

The total number of these Indians is about 5100.

To the north-east of the Mackenzie River, in the southern portion of the Barren Lands, the country was formerly occupied by the Northern or Chipewyan Indians, but towards the end of the eighteenth century they were destroyed by a plague or disease, probably smallpox, and doubtless the country was untenanted for a time. At some time since that date the Eskimos from the Arctic coast or from Hudson Bay moved inland and now occupy the basins of the Dubawnt and Kazan Rivers, while at the same time they still continue to live around the shores of the Arctic Ocean and Hudson Bay. The total number of Eskimos, as given in the report of the department of Indian Affairs for 1911, is as follows :

Western shore of Hudson Bay . . .	1360
Arctic coast-line to Herschel Island . .	850
Herschel Island	400
	2610

Until the Royal North-West Mounted Police built a police post at Cape Fullerton on the north-west side of Hudson Bay there had never been any white settlement in this country north of the edge of the forest; in fact, the most remote line of trading-posts, chiefly belonging to the Hudson's Bay Company, may be indicated as follows : Fort Norman,

Fort Providence on the Mackenzie, Forts Rae and Resolution on Great Slave Lake.

The total population of the territories here considered is about 10,500. Of these 7710 have been accounted for as Indians and Eskimos, and the remaining 2790 are half-breeds with a few fur traders and missionaries.

Vegetation

In the western portion of the territories, along the valley of the Mackenzie River and to the west of it, the vegetation is similar to that of the forests of Manitoba, Saskatchewan, and Alberta. The trees are: canoe birch, white and black spruce, tamarac, black and white poplar. In the more open places there is strong growth of grass and sedge associated with vetches and 'pea-vine.' But proceeding to the north-east and north the vegetation becomes more stunted and is confined to the river bottoms, the higher hills back from the streams being quite bare. Then the forest in the lowlands breaks up into disconnected groves, which become farther and farther apart until they finally disappear, and all the country becomes what is known as the 'Barren Lands.' These Barren Lands are great treeless plains which comprise about half of the total area of the North-West Territories, including the Arctic islands, have a generally stony soil, and as a rule are lightly covered with sedges or short grasses interspersed with many Arctic plants of which the following are perhaps the most abundant and characteristic:

> Ranunculus affinis and lapponicus, Papaver nudicaule, Cardamine pratensis and digitata, Draba hirta and incana, Cochlearia officinalis, Silene acaulis, Lychnis apetala and affinis, Stellaria longipes, Cerastium alpinum, Oxytropis leucantha, Hedysarum boreale, Dryas integrifolia, Potentilla nivea and nana, Saxifraga oppositifolia, caespitosa, rivularis, cernua, nivalis, punctata, and hirculus, Hippuris vulgaris, Erigeron uniflorus, Senecio palustris, Arctostaphylos alpina, Cassiope tetragona, Rhododendron lapponicum, etc.

In some places low stunted willows a few inches in height appear along the banks of the streams, but in vast stretches throughout the more northerly portion of the Barren Lands even this 'timber' is absent.

Around many of the trading stations in the valley of the Mackenzie potatoes, turnips, carrots, and many of the ordinary garden vegetables are grown successfully, and while it is hardly likely that wheat can ever be raised profitably, oats, barley, and hay will undoubtedly prove successful crops.

East of the Mackenzie River agriculture cannot be considered seriously, though in many places a few garden vegetables can doubtless be raised.

Animals

The animal life in the country varies in character from that of the forests of the timbered zone, known in North America as the Canadian Zone, in the valley of the Mackenzie River, through the Hudsonian Zone northward into the Arctic Zone.

The Canadian Zone extends northward along the valley of the Mackenzie River to latitude 65°, and towards the south it extends from the Slave River westward to the north-eastern boundary of British Columbia. The animals common in it are moose, woodland caribou, elk or wapiti, wood bison, beaver, otter, musk-rat, lynx, wolf, black bear, and grizzly bear.

North and east of the Canadian Zone the Hudsonian Zone covers the territories northward to the edge of the Barren Lands, or to a line which extends north-westward from the mouth of the Churchill River, on the shore of Hudson Bay in north latitude 59°, to the mouth of the Mackenzie River. It is a region of small and scattered forest growth. In it moose are fairly common and it is the wintering ground of the Barren Ground caribou that spend the summer on the open plains to the north. Black bears are also moderately common. Among the smaller animals the black and red fox, marten, mink, lynx, weasel, red squirrels, and rabbits are the most abundant.

The Arctic Zone embraces the Barren Lands west of Hudson Bay, as well as the Arctic islands. It is the home of the Barren Ground caribou and the musk-ox, the former, at least those inhabiting the mainland, migrating northward every spring towards the Arctic Ocean, and southward in the autumn to the edge of the forest. None of the larger animals of the Hudsonian Zone come out on the Barren Lands. The other important animals are the white wolf, the white fox, wolverine, and the Arctic hare. Among the Arctic islands are found the right whale, the walrus, and several species of seals.

The larger animals of the country furnish a substantial portion of the food of the inhabitants, while the smaller ones and those with heavy coats of fur furnish the rich peltry which are exported to the outside world in exchange for clothing and other necessaries and luxuries of life. In 1901 these territories, along with Keewatin and Ungava, produced fur to the value of $262,921.

Fish

Fish are abundant in all the streams and lakes in the country. All are good, and most of them are excellent, food. They are caught in great numbers every year, chiefly in the autumn, and, either fresh or dried, form the staple food of the people and their dogs.

Whitefish (*Coregonus quadrilateralis*, etc.) is the principal food fish of the north. Sir John Richardson says of it :

> Several species of this subgenus (*Coregonus*) have been celebrated for the delicacy of their flavour, but none have been more justly so than the Attihawmeg, which is an inhabitant of all the interior lakes of America, from Erie to the Arctic Sea. Several Indian hordes mainly subsist upon it, and it forms the principal food at many of the fur posts for eight or nine months of the year, the supply of other articles of diet being scanty and casual. Though it is a rich, fat dish, instead of producing satiety it becomes daily more agreeable to the palate ; and I know from experience that, though deprived of bread

and vegetables, one may live wholly upon this fish for months, or even years, without tiring.[1]

Its average weight is from two to four pounds, but it often attains a weight of ten pounds, and is said to grow as large as twenty pounds.

Tullibee (*Argyrosomus tullibee*) is very similar to the last species, but the meat is not of as good a flavour.

Great Bear Lake herring (*Argyrosomus lucidus*) is a small but excellent food fish. It is found in great numbers in Great Bear Lake, and ascends the Mackenzie River as far as Fort Simpson.

Coney (*Stenodus mackenzii*) ascends the Mackenzie and Slave Rivers as far as the rapids at Fort Smith, and is constantly found in Great Slave Lake. It attains a weight of thirty or forty and even sixty pounds.

Salmon (*Oncorhynchus nerka*) is very occasionally caught in the Mackenzie River.

Lake-trout (*Cristivomer namaycush*) is abundant in all the lakes throughout the north country, and in the larger bodies of water reaches a weight of fifty pounds or more.

Arctic grayling or bluefish (*Thymallus signifer*) occurs in clear streams throughout the region from Peace River and Athabaska Lake northward to the Arctic Ocean and eastward to Hudson Bay.

Pike (*Esox lucius*) is common almost everywhere throughout the country.

Pickerel (*Stizostedion vitreum*) is commonly taken everywhere with the whitefish, and is only inferior to it as an article of diet.

Gold-eye (*Hiodon alosoides*) is found in the southern portion of the country, being rarely found in the Mackenzie waters north of Great Slave Lake.

Smelt (*Mallosus villosus*) occurs in Hudson Bay and in the mouths of the rivers emptying into it.

In addition to the above the northern and grey suckers (*Catostomus catostomus* and *Moxostoma lesueuri*), the methye (*Lota maculosa*), the stickleback (*Pygosteus pungitius*), and several smaller fish are also common.

[1] *Fauna Boreali-Americana*, iii. p. 195

In the Census Report of 1901 the following return is given of the weight and value of the fish caught in the North-West Territories, which, however, then covered a much larger area than they do now.

	lb.	$
Whitefish	3,197,240	87,500
Tullibee	94,525	2,668
Trout	79,600	4,000
Pickerel	784,246	16,602
Pike	1,175,825	24,405
Gold-eye	17,725	890
Coarse fish and not specified	326,250	3,720
Total	5,675,411	139,785

Minerals

While up to the present time the chief product of the country has been the furs taken from its wild animals, and its next most important source of wealth may have been its agriculture, still there is a very large area entirely outside the forest or agricultural zones which must depend on its mineral wealth if it is going to have any definite value. As has been shown in speaking of the geology of the district, very large areas are underlain by granitoid rocks, and with these are associated some small areas of basic Keewatin rocks similar to those from which the gold, silver, nickel, and other minerals in the Province of Ontario are now being mined, but as yet none of these areas have been prospected and nothing is known of their possible mineral contents. The various minerals which are known or may reasonably be expected to occur may be enumerated as follows :

Gold.—The earliest mining stampede to any part of Canada was to a little bay in Frobisher Inlet, where in 1576 Sir Martin Frobisher cast anchor beside the bleak shore of Baffin Land. He brought back with him a stone which was declared to contain gold, and in the two following years, encouraged and outfitted by Queen Elizabeth and some of her nobles, he returned to the same place and loaded his ships,

PORTAGING PAST SMITH RAPIDS, SLAVE RIVER

which in the last expedition were fifteen in number, with what he supposed to be gold ore. As nothing further is said about the gold that was extracted from this ore, there was probably a mistake somewhere.

Dr A. P. Low has also drawn attention to the extent of the beds of sand and gravel on the north coast of Baffin Land, and to the possibility of finding gold-bearing placer deposits in them.

Dr John Rae recorded the occurrence of gold-bearing veins in Wager Inlet, north-west of the northern portion of Hudson Bay. Gold also occurs in the sands of the Peace, McLeod, Liard, and other rivers flowing from the east side of the Rocky Mountains, having probably been derived from the wearing down of the Cretaceous sandstones which form the banks of these rivers. Undoubtedly it will also be found in many of the quartz veins which cut the Keewatin rocks occurring here and there throughout the Archæan protaxis.

Silver.—Silver is very rarely detected by ordinary travellers or prospectors as they pass along the waterways, or over the portages, throughout the country. It has few highly coloured salts or ores, and the veins in which it is found are usually associated with a soft gangue, in hollows and depressions in the rocky surface, and are consequently hidden from ordinary observation. Such veins must therefore be discovered by digging and trenching with pick and shovel before their true nature can be determined. The discovery in this manner of such a large number of silver-bearing veins in the Cobalt district of Ontario was a revelation to the prospectors of Northern Canada, and leads to the hope that many other areas of similar rock, when properly prospected, will yield equally satisfactory results.

Copper.—The presence of copper is much more easily recognized than gold or silver, for many of its salts and ores are highly coloured, bright green being particularly prevalent, and many of its ores are also associated with hard vein matter, so that they may be found on salient points or on distinct elevations of the surface.

Bornite has been recorded by Captain Hall as occurring in Frobisher Bay, Baffin Land, and copper ore has been spoken

of by Sir John Ross as occurring at Agnew River. On the north-west side of Hudson Bay, between Baker Foreland and Cape Esquimaux, the Keewatin greenstone has a large quantity of copper pyrites disseminated through it. No large body of ore was seen in this region by the present writer, but where the mineral is so freely distributed throughout the mass of the rock, it is not at all improbable that large deposits may be found in favourable situations, especially near contacts with later intrusives.

On Great Slave Lake Dr Robert Bell records the occurrence of chalcopyrite, while on Great Bear Lake Dr J. M. Bell speaks of the occurrence of similar ore, but the most interesting and perhaps the most extensive copper deposits in Northern Canada are contained in the pre-Cambrian traps and sandstones in the vicinity of the Coppermine River.

The occurrence of native copper in that country has been known to the Indians and Eskimos from time immemorial, and the metal has been commonly used by them in the manufacture of knives and other implements. The first journey by a white man into the northern country was made in search of this 'mine' of copper. The explorer was Samuel Hearne, a clerk in the service of the Hudson's Bay Company at Fort Prince of Wales or Churchill, on the shore of Hudson Bay. Hearne spent two years, seven months, and twenty-four days on the expedition—from November 6, 1769, to June 30, 1772—but only a few hours on the copper-bearing rocks themselves; and as he had no knowledge of ore deposits, he was quite incapable of estimating their value.

The Copper Mountains, near the Coppermine River, were visited by Sir John Richardson in 1821, and again in 1826, and there is no record that they have been visited by any one capable of describing them since that date. Richardson's description of them is as follows:

> The Copper Mountains consist principally of trap rocks. The great mass of rock in the mountains seems to consist of felspar in various conditions; sometimes in the form of felspar rock or claystone, but most generally in the form of dark reddish amygdaloid. The amygdaloidal masses contained in the amygdaloid are either

entirely pistacite (epidote), or pistacite enclosing calc-spar. Scales of native copper are very generally disseminated through this rock, through a species of trap tuff which nearly resembles it, and also through a reddish sandstone on which it appears to rest. The rough and in general rounded and more elevated parts of the mountain are composed of the amygdaloid, but between the eminences there occur many narrow and deep valleys, which are bounded by perpendicular mural precipices of greenstone. It is in these valleys, among the loose soil, that the Indians search for copper. Among the specimens we picked up in these valleys were plates of native copper; masses of pistacite containing native copper; of trap rock with associated native copper; green malachite, copper glance, or variegated copper ore, and of greenish grey prehnite in trap with disseminated native copper; the copper in some specimens was crystallized in rhomboidal dodecahedrons. We also found some large tubular fragments, evidently portions of a vein consisting of prehnite, associated with calcareous spar and native copper. The Indians dig wherever they observe the prehnite lying on the soil, experience having taught them that the largest pieces of copper are found associated with it. We did not observe the vein in its original repository, nor does it appear that the Indians have found it, but judging from the specimens just mentioned, it most probably traverses felspathose trap. We also picked up some fragments of a greenish grey coloured rock, apparently sandstone, with disseminated variegated copper ore and copper glance; likewise rhomboidal fragments of white calcareous spar, and some rock crystals. The Indians report that they have found copper in every part of this range, which they have examined for thirty or forty miles to the north-west, and that the Esquimaux come hither to search for that metal. We afterwards found some ice chisels in the possession of the latter people, twelve or fourteen inches long, and half an inch in diameter, formed of pure copper.

In 1902 David Hanbury travelled from Chesterfield Inlet to Great Bear Lake, passing on the way along the shore of the Arctic Ocean and up the Coppermine River, though he did not visit the Copper Mountains. He describes the rocks

of Bathurst Inlet and the neighbouring parts of the Arctic coast as follows :

> On the 16th [June 1902] we reached Barry Island, which one of my Eskimo has described as the best place for copper. He now said copper was more plentiful on an island six or eight miles north of Fowler Bay. However, two pieces of native copper were found in the evening.
>
> The main rock of the island is a fine-grained basalt. It is in this rock that the native copper occurs. The copper is plentiful, for the quantity we obtained was found after but a brief search, and on a neighbouring island, Kun-nu-Yuk, a mass of copper had just been found so large that a man could hardly lift it. There, also, copper is often found in the tide-way. The whole of the lower levels on Barry Island are covered with débris from the basalt, and when the rock has been distinguished by weathering, copper has fallen out, so that flakes of the metal may be found along the sea shore.

Seven days later he says : 'We passed a small basaltic island, on which two pieces of copper ore were picked up. It seems as if copper is to be found wherever this basalt occurs.'

On June 25 he camped on Lewis Island. He says :

> This Island is formed of the same partly decomposed basalt as Barry Island. Although we did not find so much copper here, the green marks on the rocks were more numerous, but we did not spend an hour altogether in the search. One of our Eskimo knew of a large mass of copper on the south-west shore of the island, which he stated to be as much as five feet in length, and three inches thick. It protruded from the rocks under the water, it was said, but there was too much ice for us to find the copper. A piece of quartz with copper ore and native copper was picked up on the sea shore.
>
> On the 27th we rested at the north-west point of Lewis Island, where we again found the copper-bearing basalt, and accordingly we commenced a search that resulted in our collecting about two pounds weight of copper. The metal appeared to be very persistent in

its occurrence in the partly decomposed basalt, of which the islands we passed that day consisted. The flakes of copper seemed to be always vertical when in their rock matrix.

In writing of his journey up the Coppermine River he says: 'While tracking, Sandy was nearly tripped up by a chunk of native copper on the shore. It weighed about twelve pounds.'

During the present writer's exploration of the Dubawnt River in 1903, the copper-bearing rocks, similar to those of the Coppermine, were met with about the middle of the west shore of Dubawnt Lake, whence they were found to extend north-north-eastward for 125 miles to the Forks of the Dubawnt River, and from there were traced eastward for 175 miles to the outlet of Baker Lake. In 1900 James W. Tyrrell traced the same rocks westward up the Thelon River for about 125 miles.

While native copper was nowhere found in the rock formations on the Dubawnt River, the possibility of its occurrence throughout a very extensive tract of that northern country is indicated by this great extension of the copper-bearing series.

Lead.—Galena is recorded on the Arctic coast and on Great Slave Lake and Athabaska Lake.

Iron.—Iron ores are everywhere found associated with the Keewatin greenstones, and they have already been recorded from Athabaska Lake and Backs River.

Cobalt.—Cobalt bloom is known to occur on both Great Slave and Great Bear Lakes associated with greenstone and calcite.

Coal.—Coal occurs in large quantity associated with Cretaceous rocks in the south-western part of the territories. It is also found in great abundance in the Carboniferous sandstones in many of the Arctic islands. These latter rocks cover all the western islands of the Parry group and extend north-westerly into the north-west part of Ellesmere Land. Sir Edward Parry first discovered coal in the cliffs at Winter Harbour on Melville Island, and used it for fuel on his ships. The Franklin search-parties later found outcrops of

coal in other places along the southern and eastern shores of that island and in the cliffs of Bathurst Island.

These outcrops of coal indicate that the seams seen in the southern cliffs will be found extending inland over the greater portion of the islands, where they are covered by several hundred feet of newer rocks.

J. B. Tyrrell.

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